

· 综述 ·

肥胖与老年衰弱相关研究进展

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【摘要】 老年人衰弱程度可反映身体状况,发现其相关危险因素则有助于干预衰弱,改善老年人预后及生活质量。研究发现肥胖与老年衰弱相关,而体质量指数(BMI)和腰围(WC)可用来评估肥胖程度,BMI代表人体肥胖程度,WC与代谢障碍关系密切。本文通过BMI和WC两个指标综述了肥胖和老年人衰弱的研究进展,旨在阐明三者关系,为临床干预衰弱提供新思路。

【关键词】 体质量指数;腰围;衰弱

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Research progress on the correlation between obesity and geriatric frailty

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【Abstract】 The degree of frailty in the elderly can reflect physical condition, Identification of risk factors can facilitate intervention in frailty and improve the prognosis and quality of life in the elderly. Studies have found that obesity is related to frailty and that body mass index (BMI) and waist circumference (WC) can be used to evaluate the degree of obesity. BMI serves as an indicator of the degree of obesity, and WC is closely related to metabolic disorders. This paper reviews the research progress on obesity and frailty using BMI and WC as indicators with a view to clarifying the relationship between them and providing new insights for clinical intervention in frailty.

【Key words】 body mass index; waist circumference; frailty

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全球老龄化使得老年人疾病、残疾和失能带来的家庭和社会负担越来越重^[1]。衰弱是以躯体衰弱为主要特点的医学综合征,指老年人生理储备下降致机体易损性增加、抗应激能力减退的非特异状态^[2]。衰弱可提示老年人健康终点事件的危险程度,包括跌倒、住院、失能、骨折和死亡,常用来综合评估老年人的健康状况,近年受到广泛关注。尽早发现衰弱并采取相应措施,有可能挽救部分老年人的不良结局,但衰弱危险因素目前仍不清楚。研究表明肥胖与老年衰弱相关^[3]。而体质量指数(body mass index, BMI)和腰围(waist circumference, WC)与人体肥胖程度相关,BMI与一般性肥胖相关,仅代表人体肥胖程度;而WC反映人体中心性肥胖(异常肥胖),与代谢障碍密切相关。目前关于肥胖与老年人衰弱发生及衰弱预后的研究不多,为此本文

通过BMI和WC两个指标综述了肥胖和老年人衰弱的研究进展,旨在阐明三者关系,为临床干预衰弱提供新思路。

1 肥胖与衰弱发生风险

1.1 一般性肥胖与衰弱

BMI与老年人衰弱的研究较多。Woods等^[4]通过研究发现超重及肥胖老年人发生衰弱的风险较正常体重老年人增加近4倍。多个随访研究也表明,肥胖老年人衰弱发病率明显升高,即使年轻和中年时超重和肥胖的人在老年时也容易发生衰弱^[5-9]。还有研究表明,相比一直超重的老年人,随访期间体质量明显增加及持续肥胖者发生衰弱的风险也升高^[10,11]。其原因可能是肥胖老年人四肢肌肉减少、肌力下降和脂肪组织增加,肌肉组分降低和脂肪增

加可导致老年人活动能力下降,引起“肌少性肥胖”,导致衰弱发生。

1.2 中心性肥胖与衰弱

代谢障碍可增加多种疾病的发病风险、致残率和病死率,如糖尿病、高尿酸血症、心血管疾病、慢性肾脏疾病等^[12]。中心性肥胖也称腹型(异常)肥胖,它和胰岛素抵抗是代谢障碍的重要致病因素,WC为内脏脂肪指标,可在一定程度上代表脂肪在腹部的分布。Hubbard等^[13]对WC与衰弱进行了研究,结果显示WC宽的人群衰弱风险明显增加,即使低体重,WC宽的人衰弱风险仍高。Shah等^[14]对40例感染艾滋病病毒的老年人进行研究,通过双能X线吸收仪测定内脏脂肪分布,结果显示腹型肥胖和脂肪异常分布的人衰弱风险明显升高。一项汇集西班牙人群数据的研究表明,WC宽人群随访3.5年后衰弱风险明显增加($OR=1.67$)^[9]。此外,该研究还显示当个体肥胖($BMI \geq 30$)且WC宽时,衰弱风险最大($OR=2.55$)。年龄>65岁社区老年人的研究结果也显示,异常肥胖人群(即宽WC人群)衰弱风险明显升高^[15,16]。其原因可能是代谢障碍促进代谢综合征发生,而代谢综合征通过腹型肥胖促进肌少性肥胖发生^[17,18]。腹型肥胖人群患慢性炎症的风险也高。某些炎症因子如IL-6被认为与中心性肥胖相关,导致多种慢性病发生^[19]。WC还是体内氧化应激的标志物,独立于BMI存在^[20]。过度和较低的氧化应激可能是导致年龄相关衰弱的核心机制^[21]。中心性肥胖还可导致老年人患抑郁增加,并且出现认知能力下降^[22]和骨质疏松症等^[23],而抑郁、认知功能下降、骨质疏松症等都是衰弱指数中常见的因素,直接与衰弱相关。因此,这些数据支持宽WC老年人更易发生衰弱。

2 肥胖与衰弱老年人不良结局

肥胖对衰弱老年人不良结局(跌倒、住院、残疾、死亡)影响的研究较少,且结论不明,目前存在争议。

2.1 肥胖与衰弱老年人跌倒发生

老年人衰弱与跌倒关系密切,患衰弱的老年人更易跌倒。肥胖对衰弱老年人跌倒发生率的影响目前存在争议。Sheehan等^[8]对606例社区老年人研究发现,高BMI衰弱老年人跌倒发生风险显著升高。Boutin等^[24]对6662例年龄>75岁的社区老年人研究表明,正常BMI衰弱老年人跌倒风险最高,高BMI不增高衰弱老年人跌倒风险,其原因可能是肥胖老年人已被证明经常采用试探性步态,其表现

是步行速度较慢,基础支持增加^[25],而这些调整使老年人步态稳定性得到改善,从而对跌倒产生保护,该研究未发现宽WC增加衰弱老年人跌倒风险。

2.2 肥胖与衰弱老年人住院

Boutin等^[24]也发现合并高BMI及宽WC的衰弱老年人住院风险显著增加。其原因是肥胖老年人,尤其中心性肥胖老年人易合并高血压、糖尿病、冠心病、脑血管疾病等,这些疾病严重威胁老年人健康,易产生各种并发症,从而增高老年人的住院率^[25,26]。而中心性肥胖易导致氧化应激和慢性炎症反应,这些都与老年人衰弱密切相关,这些因素共同作用导致肥胖以及中心性肥胖老年人住院率明显增高。

2.3 肥胖与衰弱老年人日常生活活动能力

老年人功能残疾的严重程度取决于其所合并疾病的类型和严重程度,进行性功能丧失会增加老年人失能、住院和死亡风险^[27]。文献报道超重及肥胖均可致老年人活动功能受限和残疾^[28]。但超重及肥胖对衰弱老年人日常生活活动能力的影响不同。Bowen等^[29]研究发现,超重及肥胖能减少衰弱老年人的功能限制障碍及残疾,可能对衰弱老年人起保护作用。其原因是合并超重或肥胖的衰弱老年人人体质量没有明显下降,因此更易从较多营养和能量中受益,从而降低他们对外界压力源的整体脆弱性^[30]。同时体质量高的衰弱老年人骨密度相对较高,可降低患骨质疏松症风险,减少有害跌倒、髌部骨折^[31]和其他可能导致功能限制和残疾的不良事件发生。

2.4 肥胖与衰弱老年人死亡率

关于肥胖与死亡率的关系目前仍有争议。许多研究报道了BMI与死亡率相关图形呈“J形”或“U形”^[32],也就是说低体质量及肥胖均增加老年人死亡率。然而,也有文献提出“肥胖悖论”,该理论认为超重和肥胖对老年人死亡的影响不大,甚至可保护 ≥ 65 岁人群的死亡风险^[33]。BMI对衰弱老年人死亡的影响目前结论不明。Lee等^[5]研究发现,肥胖显著增加衰弱老年人的死亡率,但超重对衰弱老年人的死亡风险存在保护。Boutin等^[24]的研究也表明,衰弱老年人BMI越高死亡风险越低,提示高BMI可对衰弱老年人起保护作用。但宽WC显著增加衰弱老年人的死亡率,因此BMI与衰弱老年人死亡率关系争议较大,仍需更多研究去证实。

综上所述,肥胖与老年人衰弱发生风险和不良结局密切相关。一般性肥胖和中心性肥胖老年人衰弱风险均升高,中心性肥胖不良结局风险更大。

BMI对衰弱老年人不良结局的影响目前仍有争议,需更多研究去证实。临床医师应多关注肥胖老年人,尤其对WC宽的老年人进行干预,对改善老年人预后帮助很大。

【参考文献】

[1] Kinsella K, Phillips DR. Global aging: the challenge of success[J]. *Popul Bull*, 2005, 60(1): 3-34.

[2] Fried LP, Tangen CM, Walston J, *et al.* Frailty in older adults: evidence for a phenotype[J]. *J Gerontol A Biol Sci Med Sci*, 2001, 56(3): M146-M156.

[3] Blaum CS, Xue QL, Michelson E, *et al.* The association between obesity and the frailty syndrome in older women: the Women's Health and Aging Studies[J]. *J Am Geriatr Soc*, 2005, 53(6): 927-934. DOI: 10.1111/j.1532-5415.2005.53300.x.

[4] Woods NF, LaCroix AZ, Gray SL, *et al.* Frailty: emergence and consequences in women aged 65 and older in the Women's Health Initiative Observational Study[J]. *J Am Geriatr Soc*, 2005, 53(8): 1321-1330. DOI: 10.1111/j.1532-5415.2005.53405.x.

[5] Lee Y, Kim J, Han ES, *et al.* Frailty and body mass index as predictors of 3-year mortality in older adults living in the community[J]. *Gerontology*, 2014, 60(6): 475-482. DOI: 10.1159/000362330.

[6] Strandberg TE, Sirola J, Pitkälä KH, *et al.* Association of midlife obesity and cardiovascular risk with old age frailty: a 26-year follow-up of initially healthy men[J]. *Int J Obes (Lond)*, 2012, 36(9): 1153-1157. DOI: 10.1038/ijo.2012.83.

[7] Stenholm S, Strandberg TE, Pitkala K, *et al.* Midlife obesity and risk of frailty in old age during a 22-year follow-up in men and women: the Mini-Finland Follow-up Survey[J]. *J Gerontol A Biol Sci Med Sci*, 2014, 69(1): 73-78. DOI: 10.1093/gerona/glt052.

[8] Sheehan KJ, O'Connell MD, Cunningham C, *et al.* The relationship between increased body mass index and frailty on falls in community dwelling older adults[J]. *BMC Geriatr*, 2013, 13: 132. DOI: 10.1186/1471-2318-13-132.

[9] García-Esquinas E, José García-García F, León-Muñoz LM, *et al.* Obesity, fat distribution, and risk of frailty in two population-based cohorts of older adults in Spain[J]. *Obesity (Silver Spring)*, 2015, 23(4): 847-855. DOI: 10.1002/oby.21013.

[10] Strandberg TE, Stenholm S, Strandberg AY, *et al.* The "obesity paradox", frailty, disability, and mortality in older men: a prospective, longitudinal cohort study[J]. *Am J Epidemiol*, 2013, 178(9): 1452-1460. DOI: 10.1093/aje/kwt157.

[11] Mezuk B, Lohman MC, Rock AK, *et al.* Trajectories of body mass indices and development of frailty: evidence from the health and retirement study[J]. *Obesity (Silver Spring)*, 2016, 24(8): 1643-1647. DOI: 10.1002/oby.21572.

[12] Lao XQ, Ma WJ, Sobko T, *et al.* Dramatic escalation in metabolic syndrome and cardiovascular risk in a Chinese population experiencing rapid economic development[J]. *BMC Public Health*, 2014, 14: 983. DOI: 10.1186/1471-2458-14-983.

[13] Hubbard RE, Lang IA, Llewellyn DJ, *et al.* Frailty, body mass index, and abdominal obesity in older people[J]. *J Gerontol A Biol Sci Med Sci*, 2010, 65(4): 377-381. DOI: 10.1093/gerona/glp186.

[14] Shah K, Hilton TN, Myers L, *et al.* A new frailty syndrome: central obesity and frailty in human immunodeficiency virus (HIV)-infected older adults[J]. *J Am Geriatr Soc*, 2012, 60(3): 545-549. DOI: 10.1111/j.1532-5415.2011.03819.x.

[15] Ramsay SE, Arianayagam DS, Whincup PH, *et al.* Cardiovascular risk profile and frailty in a population-based study of older British men[J]. *Heart*, 2015, 101(8): 616-622. DOI: 10.1136/heartjnl-2014-306472.

[16] Ferriolli E, Pessanha FPADS, Moreira VG, *et al.* Body composition and frailty profiles in Brazilian older people: Frailty in Brazilian Older People Study-FIBRA-BR[J]. *Arch Gerontol Geriatr*, 2017, 71: 99-104. DOI: 10.1016/j.archger.2017.03.008.

[17] Chung JY, Kang HT, Lee DC, *et al.* Body composition and its association with cardiometabolic risk factors in the elderly: a focus on sarcopenic obesity[J]. *Arch Gerontol Geriatr*, 2013, 56(1): 270-278. DOI: 10.1016/j.archger.2012.09.007.

[18] Tanaka K, Kanazawa I, Sugimoto T. Reduction in endogenous insulin secretion is a risk factor of sarcopenia in men with type 2 diabetes mellitus[J]. *Calcif Tissue Int*, 2015, 97(4): 385-390. DOI: 10.1007/s00223-015-9990-8.

[19] Hardy OT, Czech MP, Corvera S. What causes the insulin resistance underlying obesity? [J]. *Curr Opin Endocrinol Diabetes Obes*, 2012, 19(2): 81-87. DOI: 10.1097/MED.0b013e3283514e13.

[20] Weinbrenner T, Schröder H, Escurriol V, *et al.* Circulating oxidized LDL is associated with increased waist circumference independent of body mass index in men and women[J]. *Am J Clin Nutr*, 2006, 83(1): 30-35. DOI: 10.1093/ajcn/83.1.30.

[21] Soysal P, Isik AT, Carvalho AF, *et al.* Oxidative stress and frailty: a systematic review and synthesis of the best evidence[J]. *Maturitas*, 2017, 99: 66-72. DOI: 10.1016/j.maturitas.2017.01.006.

[22] Sakakura K, Hoshida S, Ishikawa J, *et al.* Association of body mass index with cognitive function in elderly hypertensive Japanese[J]. *Am J Hypertens*, 2008, 21(6): 627-632. DOI: 10.1038/ajh.2008.157.

[23] Felson DT, Zhang Y, Hannan MT, *et al.* Effects of weight and body mass index on bone mineral density in men and women: the Framingham study[J]. *J Bone Miner Res*, 1993, 8(5): 567-573. DOI: 10.1002/jbmr.5650080507.

[24] Boutin E, Natella PA, Schott AM, *et al.* Interrelations between body mass index, frailty, and clinical adverse events in older community-dwelling women: The EPIDOS cohort study[J]. *Clin Nutr*, 2018, 37(5): 1638-1644. DOI: 10.1016/j.clnu.2017.07.023.

[25] Pérez-Tasigchana RF, León-Muñoz LM, Lopez-García E, *et al.* Metabolic syndrome and insulin resistance are associated with frailty in older adults: a prospective cohort study[J]. *Age Ageing*, 2017, 46(5): 807-812. DOI: 10.1093/ageing/afx023.

[26] Cerhan JR, Moore SC, Jacobs EJ, *et al.* A pooled analysis of waist circumference and mortality in 650,000 adults[J]. *Mayo Clin Proc*, 2014, 89(3): 335-345. DOI: 10.1016/j.mayocp.2013.11.011.

[27] Choi J, Joseph L, Pilote L. Obesity and C-reactive protein in various populations: a systematic review and meta-analysis[J]. *Obes Rev*, 2013, 14(3): 232-244. DOI: 10.1111/obr.12003.

[28] Houston DK, Ding J, Nicklas BJ, *et al.* Overweight and obesity over the adult life course and incident mobility limitation in older adults: the health, aging and body composition study[J]. *Am J Epidemiol*, 2009, 169(8): 927-936. DOI: 10.1093/aje/kwp007.

[29] Bowen ME. The relationship between body weight, frailty, and the disablement process[J]. *J Gerontol B Psychol Sci Soc Sci*, 2012, 67(5): 618-626. DOI: 10.1093/geronb/gbs067.

[30] Villareal DT, Banks M, Siener C, *et al.* Physical frailty and body composition in obese elderly men and women[J]. *Obes Res*, 2004, 12(6): 913-920. DOI: 10.1038/oby.2004.111.

[31] Vellas BJ, Wayne SJ, Garry PJ, *et al.* A two-year longitudinal study of falls in 482 community-dwelling elderly adults[J]. *J Gerontol A Biol Sci Med Sci*, 1998, 53(4): M264-M274.

[32] Dorner TE, Rieder A. Obesity paradox in elderly patients with cardiovascular diseases[J]. *Int J Cardiol*, 2012, 155(1): 56-65. DOI: 10.1016/j.ijcard.2011.01.076.

[33] DeCaria JE, Sharp C, Petrella RJ. Scoping review report: obesity in older adults[J]. *Int J Obes (Lond)*, 2012, 36(9): 1141-1150. DOI: 10.1038/ijo.2012.29.