

认知衰弱增加老年人群 5 年后的跌倒风险

袁景林¹, 马雅军², 李晓东², 蒋晓燕³, 王笑峰⁴, 李淑娟², 周晓梅^{1*}

(1. 北京市大兴区人民医院 神经内科, 北京 102600; 2. 首都医科大学附属北京朝阳医院 神经内科, 北京 100020;
3. 同济大学医学院 病理学与病理生理学系 心律失常教育部重点实验室, 上海 200092;
4. 复旦大学 人类表型组研究院 现代人类学教育部重点实验室, 上海 200433)

摘要:目的 探索认知衰弱是否能增加中国老年人群 5 年后跌倒风险。方法 研究数据来源于如皋衰老队列。采用 Fried 衰弱表型评估衰弱, 5 项中符合 ≥ 3 项者定义为衰弱, 1~2 项者为衰弱前期, 均不符合者为强健。采用改良版长谷川痴呆量表 (HDS-R) 评估认知功能, 排除严重认知功能障碍 (HDS-R ≤ 10 分) 后得分最低的四分位数为认知障碍。同时存在认知障碍和衰弱者定义为认知衰弱。应用二元 Logistic 回归分析衰弱及认知衰弱随访 5 年后的跌倒风险。结果 本研究纳入 962 例研究对象, 基线时平均年龄为 (74.7 \pm 3.7) 岁, 女性 526 人。经过 5 年随访, 134 人发生跌倒事件, 女性、文盲、非在婚状态跌倒的发生率更高。Logistic 回归分析结果显示, 基线衰弱者更易发生跌倒 ($OR=4.360, 95\% CI=1.955\sim 9.722$), 认知衰弱者相对强健且非认知障碍者跌倒风险更高 ($OR=6.000, 95\% CI=1.935\sim 18.603$)。调整协变量后, 认知衰弱较高者 5 年跌倒风险仍具有统计学意义 ($OR=6.736, 95\% CI=1.897\sim 23.922, P<0.01$)。结论 认知衰弱较衰弱具有更高的 5 年后跌倒风险, 对于评估老年人跌倒风险具有重要意义。

关键词: 衰弱; 认知衰弱; 跌倒风险; 纵向研究

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Cognitive frailty increases the risk of falls of elderly in five years

YUAN Jing-lin¹, MA Ya-jun², LI Xiao-dong², JIANG Xiao-yan³, WANG Xiao-feng⁴,
LI Shu-juan², ZHOU Xiao-mei^{1*}

(1. Department of Neurology, Beijing Daxing District People's Hospital, Beijing 102600; 2. Department of Neurology, Beijing Chaoyang Hospital, Capital Medical University, Beijing 100020; 3. Key Laboratory of Arrhythmias, Ministry of Education, Department of Pathology and Pathophysiology, School of Medicine, Tongji University, Shanghai 200092; 4. Ministry of Education Key Laboratory of Contemporary Anthropology, Human Phenome Institute, Fudan University, Shanghai 200433, China)

Abstract: Objective To explore whether cognitive frailty increases the risk of falls 5 years later in elderly Chinese population. **Methods** The data were collected from the Rugao Aging Cohort. Fried frailty phenotype was used to evaluate frailty. Those who met ≥ 3 of the five criteria were defined as frailty, those who met 1-2 criteria were defined as pre-frailty, and those who did not meet any criteria were considered to be robust. The revised Hasegawa Dementia Scale (HDS-R) was used to evaluate cognitive function. Excluding severe cognitive impairment (HDS-R ≤ 10), the lowest quartile of scores was cognitive impairment. Those with both frailty and cognitive impairment

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* 通信作者 (corresponding author): shujuanli@cemu.edu.cn

were defined as cognitive frailty. Binary logistic regression was used to analyze frailty and falls risk at 5-year follow-up, and explore the effect of cognitive frailty (frailty plus cognitive function assessment) on falls risk. **Results** This study included 962 subjects with a mean age of 74.7 ± 3.7 years at baseline, including 526 females. After 5 years of follow-up, 134 people experienced falls in the last year of following up. The incidence of falls was higher in female, illiterate and unmarried subgroups. Logistic regression analysis showed that the frail subjects at baseline were more likely to fall ($OR=4.360, 95\% CI=1.955-9.722$), and those with cognitive frailty had a higher risk of fall than those robust without cognitive impairment ($OR=6.000, 95\% CI=1.935-18.603$). After adjusting for covariates, the higher five-year falls risk for cognitive frailty remained statistically significant ($OR=6.736, 95\% CI=1.897-23.922, P<0.05$). **Conclusions** Cognitive frailty is significantly correlated with a higher risk of falls after 5 years. The assessment of cognitive frailty is important for assessing the risk of falls in older adults.

Key words: frailty; cognitive frailty; falls risk factors; longitudinal study

跌倒是一个重要公共卫生问题,是对老年人健康和独立的主要威胁,也是老年人受伤和死亡的重要原因^[1]。2014年全国损伤监测系统(National Injury Surveillance System, NISS)显示,中国60岁以上人群跌倒发生占人群意外伤害总数的52.81%^[2]。因此,老年人的跌倒预防十分重要。

目前,跌倒发生的危险因素及干预措施研究广泛,身体衰弱及认知障碍均为跌倒的高危因素^[3]。2013年国际共识报告提出了“认知衰弱(cognitive frailty, CF)”的概念,即同时存在身体衰弱及认知障碍并排除痴呆可能^[4]。然而,认知衰弱对跌倒的影响鲜有报道。因此,本研究利用如皋长寿与衰老队列数据,首先探索了衰弱者5年后跌倒风险,然后在衰弱基础上加入对认知的评估,即认知衰弱对跌倒风险的影响。

1 对象与方法

1.1 对象

研究对象来自“如皋衰老纵向研究”,采用2014年11至12月基线调查数据与2019年12月的5年随访调查数据^[5]。2014年,在中国著名长寿之乡——江苏省如皋市的江安镇31个村,采用分层随机抽样法,选取符合纳入标准的70~84岁老人,均为汉族,后1.5年、3年和5年进行了3次随访调查,最终1219人同时参与基线和5年随访调查,962例具有完整的跌倒和认知衰弱数据被纳入本研究。本研究通过了复旦大学伦理委员会的审查(伦研批第278号)。所有参与者均签署了书面知情同意书。

1.2 方法

1.2.1 一般资料的收集:现场测量参与者身高、体质量、血压、血糖等信息,问卷调查收集参与者姓名、性别、年龄、职业、教育水平、婚姻状况、生活方式(吸烟、饮酒)、疾病史(高血压、糖尿病),进行ADL量表(Activity of Daily Living Scale, ADL)、抑郁量表等筛查。

1.2.2 评估衰弱:采用Fried衰弱表型^[6]评估参与者身体衰弱情况,包括:1)体质量降低(过去一年体质量减少超过9斤或者每年减少5%);2)精疲力竭[是否经常(一周内有3~4d或者更多)感觉精疲力尽];3)活力下降(步行半里路是否需要帮助);4)力量减少(最大握力占全部研究人群最低的20%)和5)步速减慢(性别分层的6m起立行走测试步速最慢的20%)。在Fried衰弱表型5项中符合 ≥ 3 项者定义为衰弱,1~2项者为衰弱前期,均不符合者为强健^[6]。

1.2.3 评估认知功能:采用改良长谷川痴呆量表(Revised Hasegawa Dementia Scale, HDS-R)评估参与者的认知功能^[7]。HDS-R对受检人群的定向力、记忆力、近记忆力、计算力及常识5个维度进行评价,总分32.5分。本研究中,得分最低的四分位数被定义为认知障碍。根据认知衰弱概念,排除严重认知功能障碍($HDS-R \leq 10$ 分),将同时存在认知障碍和衰弱者定义为认知衰弱^[4]。

1.2.4 定义跌倒事件:跌倒数据来源于调查问卷:近1年跌倒发生的次数。考虑到跌倒发生情况存在偶然性及受到基线已有跌倒史的影响,排除了基线时近1年已经发生过跌倒的参与者,将5年随访调

查时近 1 年发生过 1 次及以上跌倒定义为跌倒组,未发生过跌倒的定义为非跌倒组。

1.2.5 其他协变量及分组的方法:年龄(70~74 岁、75~79 岁、80~84 岁)、教育水平(文盲、受过教育)、婚姻状况(在婚、其他=离婚、丧偶、未婚)、吸烟状况(目前吸烟=吸烟 1 支/天且超过半年,曾经吸烟=曾连续吸烟 6 个月以上,不吸烟)、饮酒状况(目前饮酒=饮酒 1 两/天且超过半年,曾经饮酒=曾连续饮酒 6 个月以上,不饮酒)。糖尿病定义为空腹血糖 ≥ 7 mmol/L,或糖尿病病史,或正在服用降糖药物。高血压定义为收缩压 ≥ 140 mmHg 或舒张压 ≥ 90 mmHg(1 mmHg=0.133 kPa),或有高血压病史,或正在服用降压药物。体质指数(BMI, kg/m²)分为 <18.5 、 $18.5\sim 23.99$ 及 ≥ 24 三组。抑郁应用老年抑郁量表(GDS-15)评估,包含 15 个条目,共 15 分,大于等于 6 分即定义为抑郁表现^[8]。日常活动能力(ADL)采用 Katz 指数评估,共 6 项,6 项之中有任意一项以上需要帮助则定义为 ADL 失能。自我评价健康状况数据来自问卷调查:主要是与同龄人比较目前的健康状况。

1.3 统计学分析

采用 SPSS 25.0 统计软件对采集的数据进行处理分析。计量资料采用“均数 \pm 标准差($\bar{x}\pm s$)”表示,应用独立样本 *t* 检验进行分析。两组间比较采用卡方检验。判断跌倒危险因素采用多因素 Logistic 回归分析。

2 结果

2.1 跌倒人群的基本信息

本研究纳入 962 例为研究对象。表 1 显示了基线衰弱分组的人群特征,表 2 显示了根据 5 年随访是否发生跌倒结局分组的研究对象基本信息。研究对象在基线时平均年龄为(74.7 \pm 3.7)岁,其中女性 526 例,占总人数的 54.7%。大多数为文盲、农民、在婚状态、不吸烟、不饮酒、自我评价身体健康状况良好。ADL 量表评估超过 90% 以上无日常活动能力障碍。抑郁量表评估超过 90% 的人无抑郁表现。2.9% 的人存在衰弱表现。

2.2 二元 Logistic 回归分析预测 5 年后跌倒发生

经过 5 年随访,有 134 例(13.9%)最近 1 年经历了跌倒事件。衰弱组、衰弱前期、强健组跌倒发生率分别为 39.3%、13.5%、12.9%。在未经调整的 Logistic 回归中,基线时的衰弱者 5 年后的跌倒风险为强健者的 4.4 倍($OR=4.360, 95\% CI=1.955\sim 9.722$),而认知衰弱参与者的未经调整的跌倒风险是无认知障碍的强健个体的 6 倍($OR=6.000, 95\% CI=1.935\sim 18.603$)。在调整了上述所有协变量后,衰弱、认知衰弱参与者仍具有较高的风险,且认知衰弱参与者的跌倒风险是无认知障碍的强健个体的 6.7 倍($OR=6.736, 95\% CI=1.897\sim 23.922, P<0.01$),衰弱者跌倒风险为强健参与者的约 6.0 倍($OR=5.956, 95\% CI=2.359\sim 15.037$)(表 3)。

表 1 基线衰弱分组的人群基本特征

Table 1 Basic characteristics of the population in the baseline frailty subgroup

| characteristics | total | robust | pre-frailty | frailty | <i>P</i> value |
|---------------------------------|-----------|-----------|-------------|-----------|----------------|
| gender[<i>n</i> (%)] | 962 | | | | 0.799 |
| male | 436(45.3) | 233(46.3) | 191(44.3) | 12(42.9) | |
| female | 526(54.7) | 270(53.7) | 240(55.7) | 16(57.1) | |
| occupation[<i>n</i> (%)] | 962 | | | | 0.000* |
| others | 108(11.2) | 75(14.9) | 33(7.7) | 0(0) | |
| farmer | 854(88.8) | 428(85.1) | 398(92.3) | 28(100.0) | |
| education level[<i>n</i> (%)] | 962 | | | | 0.059 |
| literate | 465(48.3) | 261(51.9) | 193(44.8) | 11(39.3) | |
| illiterate | 497(51.7) | 242(48.1) | 238(55.2) | 17(60.7) | |
| marital status[<i>n</i> (%)] | 962 | | | | 0.507 |
| others | 299(31.1) | 148(29.4) | 142(32.9) | 9(32.1) | |
| currently married | 663(68.9) | 355(70.6) | 289(67.1) | 19(67.9) | |

续表 1

| characteristics | total | robust | pre-frailty | frailty | <i>P</i> value |
|--|-----------|-----------|-------------|----------|----------------|
| smoking status[<i>n</i> (%)] | 962 | | | | 0.320 |
| never | 720(74.8) | 369(73.4) | 331(76.8) | 20(71.4) | |
| current | 145(15.1) | 77(15.3) | 65(15.1) | 3(10.7) | |
| ever | 97(10.1) | 57(11.3) | 35(8.1) | 5(17.9) | |
| alcohol consumption[<i>n</i> (%)] | 962 | | | | 0.087 |
| never | 677(70.4) | 336(66.8) | 319(74.0) | 22(78.6) | |
| current | 192(20.0) | 116(23.1) | 73(16.9) | 3(10.7) | |
| ever | 93(9.7) | 51(10.1) | 39(9.0) | 3(10.7) | |
| self-assessment health[<i>n</i> (%)] | 962 | | | | 0.000* |
| healthy | 745(77.4) | 424(84.3) | 314(72.9) | 7(25.0) | |
| not healthy | 217(22.6) | 79(15.7) | 117(27.1) | 21(75.0) | |
| hypertension[<i>n</i> (%)] | 962 | | | | 0.475 |
| no | 190(19.8) | 101(20.1) | 86(20.0) | 3(10.7) | |
| yes | 772(80.2) | 402(79.9) | 345(80.0) | 25(89.3) | |
| diabetes[<i>n</i> (%)] | 962 | | | | 0.047* |
| no | 828(86.1) | 444(88.3) | 363(84.2) | 21(75.0) | |
| yes | 134(13.9) | 59(11.7) | 68(15.8) | 7(25.0) | |
| depression[<i>n</i> (%)] | 962 | | | | 0.000* |
| not depressed | 891(92.6) | 481(95.6) | 387(89.8) | 23(82.1) | |
| depressed | 71(7.4) | 22(4.4) | 44(10.2) | 5(17.9) | |
| ADL assessment[<i>n</i> (%)] | 962 | | | | 0.000* |
| normal | 920(95.6) | 491(97.6) | 406(94.2) | 23(82.1) | |
| ADL disability | 42(4.4) | 12(2.4) | 25(5.8) | 5(17.9) | |

**P*<0.05, ADL. activities of daily living.

表 2 5 年随访时跌倒事件分组的一般特征

Table 2 General characteristics of people with falls during 5-year follow-up

| characteristics | total | not-falls group | falls group | <i>P</i> value |
|---------------------------------|------------|-----------------|-------------|----------------|
| age, year | 74.7±3.7 | 74.7±3.7 | 75.1±3.8 | 0.232 |
| BMI(kg/m ²) | 24.20±3.42 | 24.13±3.36 | 24.66±3.67 | 0.094 |
| gender[<i>n</i> (%)] | 962 | | | 0.001* |
| male | 436(45.3) | 393(47.5) | 43(32.1) | |
| female | 526(54.7) | 435(52.5) | 91(67.9) | |
| occupation[<i>n</i> (%)] | 962 | | | 0.547 |
| others | 854(88.8) | 733(88.5) | 121(90.3) | |
| farmer | 108(11.2) | 95(11.5) | 13(9.7) | |
| education level[<i>n</i> (%)] | 962 | | | 0.017* |
| literate | 465(48.3) | 413(49.9) | 52(38.8) | |
| illiterate | 497(51.7) | 415(50.1) | 82(61.2) | |

续表 2

| characteristics | total | not-falls group | falls group | <i>P</i> value |
|--|-----------|-----------------|-------------|----------------|
| marital status[<i>n</i> (%)] | 962 | | | 0.037 |
| others | 299(31.1) | 247(29.8) | 52(38.8) | |
| currently married | 663(68.9) | 581(70.2) | 82(61.2) | |
| smoking status[<i>n</i> (%)] | 962 | | | 0.002* |
| never | 720(74.8) | 603(72.8) | 117(87.3) | |
| current | 145(15.1) | 135(16.3) | 10(7.5) | |
| ever | 97(10.1) | 90(10.9) | 7(5.2) | |
| alcohol consumption[<i>n</i> (%)] | 962 | | | 0.932 |
| never | 677(70.4) | 581(70.2) | 96(71.6) | |
| current | 192(20.0) | 166(20.0) | 26(19.4) | |
| ever | 93(9.7) | 81(9.8) | 12(9.0) | |
| self-assessment health[<i>n</i> (%)] | 962 | | | 0.693 |
| healthy | 745(77.4) | 643(77.7) | 102(76.1) | |
| not healthy | 217(22.6) | 185(22.3) | 32(23.9) | |
| hypertension[<i>n</i> (%)] | 962 | | | 0.126 |
| no | 190(19.8) | 157(19.0) | 33(24.6) | |
| yes | 772(80.2) | 671(81.0) | 101(75.4) | |
| diabetes[<i>n</i> (%)] | 962 | | | 0.088 |
| no | 828(86.1) | 719(86.8) | 109(81.3) | |
| yes | 134(13.9) | 109(13.2) | 25(18.7) | |
| depression[<i>n</i> (%)] | 962 | | | 0.143 |
| not depressed | 891(92.6) | 771(93.1) | 120(89.6) | |
| depressed | 71(7.4) | 57(6.9) | 14(10.4) | |
| ADL assessment[<i>n</i> (%)] | 962 | | | 0.698 |
| normal | 920(95.6) | 791(95.5) | 129(96.3) | |
| ADL disability | 42(4.4) | 37(4.5) | 5(3.7) | |
| frailty phenotype[<i>n</i> (%)] | 962 | | | 0.000 |
| robust | 503(52.3) | 438(52.9) | 65(48.5) | |
| pre-frailty | 431(44.8) | 373(45.0) | 58(43.3) | |
| frailty | 28(2.9) | 17(2.1) | 11(8.2) | |
| cognitive and frailty[<i>n</i> (%)] | 962 | | | 0.005* |
| non-CoI+robust | 384(39.9) | 336(40.6) | 48(35.8) | |
| CoI+robust | 119(12.4) | 102(12.3) | 17(12.7) | |
| non-CoI+pre-frailty | 300(31.2) | 259(31.3) | 41(30.6) | |
| CoI+Pre-frailty | 131(13.6) | 114(13.8) | 17(12.7) | |
| non-CoI+frailty | 15(1.6) | 10(1.2) | 5(3.7) | |
| CoI+frailty(CF) | 13(1.4) | 7(0.8) | 6(4.5) | |

**P*<0.05, ADL. activities of daily living; BMI. body mass index; CF. cognitive frailty; CoI. cognitive impairment.

表3 衰弱、认知衰弱和5年随访跌倒的Logistic回归分析

Table 3 Logistic regression analysis of frailty/cognitive frailty and falls during 5-year follow-up

| group | crude model | | adjusted model [#] | |
|---------------------|----------------------|---------|-----------------------------|---------|
| | OR (95% CI) | P value | OR (95% CI) | P value |
| frailty | | | | |
| robust | 1 | | 1 | |
| pre-frailty | 1.048 (0.717-1.532) | 0.810 | 1.063 (0.709-1.593) | 0.767 |
| frailty | 4.360 (1.955-9.722) | 0.000* | 5.956 (2.359-15.037) | 0.000* |
| cognitive frailty | | | | |
| non-CoI+robust | 1 | | 1 | |
| CoI+robust | 1.167 (0.643-2.117) | 0.612 | 0.986 (0.528-1.839) | 0.964 |
| non-CoI+pre-frailty | 1.108 (0.709-1.733) | 0.653 | 1.100 (0.688-1.757) | 0.691 |
| CoI+pre-frailty | 1.044 (0.577-1.888) | 0.887 | 0.966 (0.510-1.831) | 0.917 |
| non-CoI+frailty | 3.500 (1.147-10.677) | 0.028* | 5.150 (1.498-17.706) | 0.009* |
| CoI+frailty (CF) | 6.000 (1.935-18.603) | 0.002* | 6.736 (1.897-23.922) | 0.003* |

* $P < 0.05$, [#]Adjusted for sex, age, education level, marital status, occupation, BMI, smoking status, alcohol consumption, hypertension, diabetes, self-assessment health, depression and activity of daily at baseline; CF, cognitive frailty, CoI, cognitive impairment; CI, confidence interval, OR, odds ratio.

3 讨论

本研究探索了70~84岁农村老年人群衰弱、认知衰弱对跌倒的影响。研究发现,衰弱和认知衰弱均是5年随访跌倒的独立危险因素,认知衰弱的跌倒风险高于仅考虑衰弱因素时的跌倒风险,且在调整了多变量后,认知衰弱的较高跌倒风险仍具有统计学意义。

跌倒是指一种非自愿的失去平衡的事件,可造成骨折、残疾、跌倒恐惧、社会孤立,甚至死亡等结局。在美国,约30%的65岁及以上社区居民经历过跌倒,其中10%受伤严重^[9]。在中国的城市和农村,1年内跌倒的发生率分别为14.0%和17.0%^[10]。在本研究中,随访5年后跌倒事件发生率为13.9%,稍低于以往报道。这可能与研究人群的特征相关,本研究人群来自著名的中国长寿之乡——江苏如皋,大多数参与者自我评价的身体健康状况良好、无日常生活活动能力障碍、无抑郁表现,无衰弱表现。另一方面,可能与高龄组死亡或患病等失访造成的偏倚相关。

既往文献报道的跌倒与多种危险因素相关。本研究发现,女性、文盲、非在婚状态与跌倒相关,与既

往研究一致^[11-12]。非在婚状态包括离婚、丧偶、未婚等,其与跌倒的相关可能与社会孤立有关,有文献表明跌倒发生的概率随着社会孤立结构分数的增加而增加^[13]。

研究表明,衰弱增加跌倒风险^[14-15],认知障碍是跌倒的危险因素^[3-16]。然而,关于认知衰弱和跌倒的研究少有报道。在横断面研究中,认知衰弱和跌倒显著相关^[17]。认知衰弱可增加老年人3年后跌倒风险^[18]。本研究中基线衰弱使5年后的跌倒风险增加了4倍,而认知衰弱的跌倒风险是强健且非认知障碍者的6倍。在调整了多个变量后,该差异仍显著,提示认知衰弱是跌倒的独立危险因素。

本文存在一定的局限性。首先,没有量化跌倒发生的次数,偶发1次跌倒与2次及以上的复发性跌倒的特征可能不同^[19]。其次,本研究未考虑跌倒发生的环境,据观察室内跌倒与室外跌倒存在不同的模式和结果^[9]。

综上所述,女性、文盲、非在婚状态与跌倒相关。认知衰弱的参与者具有跌倒高风险,衰弱和认知功能的共同评估对于评估老年人跌倒风险具有重要意义。

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