· 临床研究 ·

中老年维持性血液透析患者体力活动能力相关因素探讨

俞会会[1,2],黄美[1],王静[3],李姗姗[1],吕爱莉[4],尼春萍[1*]

([1] 空军军医大学护理系,西安 710032;[2] 联勤保障部队第九六〇医院干部一科,济南 250031;[3] 陕西中医药大学护理系,西安 712046;[4] 西安交通大学医学部护理学系,西安 710061)

【摘 要】 **目的** 探讨中老年维持性血透患者体力活动(AP)能力现状及其影响因素。**方法** 选取 2021 年 9 月至 2022 年 2 月西安市 4 所三级甲等医院血液净化中心进行血液透析治疗的中老年终末期肾病患者,将符合纳入标准、排除标准的 315 例患者作为研究对象,使用自行设计的一般资料调查表和人类活动概况量表进行调查。采用描述性统计分析、单因素分析以及多元 logistic 回归分析患者的 PA 水平以及影响因素。采用 SPSS 26.0 软件进行数据分析。根据数据类型,组间比较采用独立样本 t 检验,Mann-Whitney U 检验及 χ^2 检验。**结果** 本研究共发放问卷 315 份,其中有效问卷 305 份(96.82%)。在最大活动得分分组中,低 PA 水平组 2 例(0.65%),中 PA 水平组 210 例(65.85%),活跃 PA 水平组 93 例(30.50%)。不同性别、年龄、文化程度、在职状况的患者,最大活动得分等级间的差异有显著统计学意义($P<0.05$)。在校正活动得分分组中,低 PA 水平组 89 例(29.18%),中 PA 水平组 180 例(59.02%),活跃 PA 水平组 36 例(11.80%)。不同年龄、文化程度、在职状况、并发症个数、患糖尿病的患者,不同 PA 水平间差异有统计学意义($P<0.05$)。以最大活动得分分级为因变量的回归模型中,年龄($OR=0.940$,95%CI 0.910~0.969)、性别($OR=1.828$,95%CI 1.042~3.206)、文化程度初中及以下($OR=0.485$,95%CI 0.254~0.927)是 PA 影响因素($P<0.05$);在以校正活动得分分级为因变量的回归模型中,年龄增长($OR=0.959$,95%CI 0.924~0.995)、性别($OR=1.782$,95%CI 1.050~3.028)、退休/病退($OR=0.379$,95%CI 0.158~0.909)、患糖尿病($OR=0.573$,95%CI −1.062~−0.050)、并发症个数为 2 个($OR=0.320$,95%CI 0.128~0.800)是 PA 的影响因素($P<0.05$)。**结论** 中老年血液透析患者的 PA 整体处于中等水平;性别、年龄、在职状况、并发症个数、是否患糖尿病是影响患者 PA 的因素。

【关键词】 中老年人;血液透析患者;体力活动水平

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Related factors for physical capacity in middle-aged and elderly patients on maintenance hemodialysis

Yu Huihui[1,2], Huang Mei[1], Wang Jing[3], Li Shanshan[1], Lyu Aili[4], Ni Chunping[1*]

([1]School of Nursing, Air Force Medical University, Xi′an 710032, China; [2]First Department of Gerontology, No. 960 Hospital of PLA Joint Logistics Support Force, Jinan 250031, China; [3]Faculty of Nursing, Shaanxi University of Chinese Medicine, Xi′an 710046, China; [4]Department of Nursing, Xi′an Jiaotong University Health Science Center, Xi′an 710061, China)

【**Abstract**】 **Objective** To explore the status quo and influencing factors for ability to perform physical activity (PA) in middle-aged and elderly patients on maintenance hemodialysis (MHD). **Methods** All the middle-aged and elderly patients with end-stage renal disease undergoing regular dialysis in the blood purification centers of four Class A tertiary hospitals in Xi′an from September 2021 to February 2022 were enrolled, and 315 of them who met our inclusion and exclusion criteria were finally subjected and served as the study objects. Self-made questionnaire and Human Activity Profile (HAP) scale were used to survey their general information and physical capacity. Descriptive statistical analysis, univariate analysis and multivariate logistic regression analysis were employed to analyze the PA levels of the patients and the influencing factors for the PA levels (low, medium and active). SPSS statistics 26.0 was used for statistical analysis. Intergroup comparison was performed using independent sample t test, Mann-Whitney U test or *Chi*-square test depending on data type. **Results** There were 305 (96.82%) valid questionnaires obtained from the 315 distributed ones. According to their maximum activity score (MAS), they were divided into low (two patients, 0.65%), moderate (210 patients, 65.85%) and active (93 patients, 30.50%) physical activity groups. Significant difference in MAS level was observed in the three physical activity groups among those with different ages, gender, education levels, employment status ($P<0.05$). Based on adjusted activity score (AAS), 89 patients were assigned in the low physical activity group (29.18%), 180 (59.02%) in the moderate, and 36 (11.80%) in the

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通信作者:尼春萍,E-mail:pingchunni@163.com

active physical activity group. Among the patients with different ages, education levels, employment status, number of comorbidities, and concomitant diabetes or not, statistical difference was found in PA level ($P<0.05$). In the regression model with MAS level as the dependent variable, age ($OR=0.940$, 95%CI 0.910-0.969), gender ($OR=1.828$, 95%CI 1.042-3.206), and education level of junior high school or below ($OR=0.485$, 95%CI 0.254-0.927) were the influencing factors for PA ($P<0.05$). In the regression model with AAS level as the dependent variable, age ($OR=0.959$, 95%CI 0.924-0.995), gender ($OR=1.782$, 95%CI 1.050-3.028), retirement/sick retirement ($OR=0.379$, 995%CI 0.158-0.909), diabetes mellitus (OR=0.573, 95%CI -1.062--0.050), and number of comorbidities ($OR=0.320$, 95%CI 0.128-0.800) were the influencing factors of PA ($P<0.05$). **Conclusion** PA is generally at a moderate level in middle-aged and elderly MHD patients. Gender, age, employment status, number of comorbidities, and having diabetes or not are factors affecting the PA level in the patients.

【Key words】 middle-aged and elderly; hemodialysis patients; physical capacity

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Corresponding author: *Ni Chunping*, *E-mail*: *pingchunni@163.com*

肾脏替代治疗是终末期肾脏病(end-stage renal disease,ESRD)患者唯一的治疗方式,包括血液透析、腹膜透析及肾脏移植[1],其中血液透析是最常用的肾脏替代治疗方式[2]。随着人口老龄化,老年血液透析患者占比逐渐增大,其中欧洲新增血液透析患者平均年龄为65.5岁[3],我国血液透析患者中老年人约占36%[4],新增透析患者中年龄>60岁患者占比61.2%[5]。接受血液透析治疗的患者死亡率明显高于年龄和性别匹配的普通人群中的患者[6]。这是因为血液透析继发引起的临床问题较多,包括体力活动(physical activity,PA)水平下降、躯体功能下降、心血管疾病等方面,其中以PA水平显著低于健康人群最为明显。与健康人群相比,血液透析患者PA仅达其35%[7]。研究表明低PA水平的血液透析患者和高PA水平的血液透析患者相比,1年后死亡风险增加了62%[8,9]。提高PA水平对血液透析患者的死亡率等健康结局指标有显著的改善作用,因此有必要探讨中老年血液透析患者PA水平的影响因素,为今后PA水平降低的预防及临床干预提供参考。

1 对象与方法

1.1 研究对象

抽取2021年9月至2022年2月西安市4所三级甲等医院血液净化中心进行规律血液透析治疗的ESRD患者为研究对象。

纳入标准:(1)年龄≥45岁,诊断为ESRD(改善全球肾脏病预后组织:肾小球滤过率低于15 ml/min),病情呈稳定状态;(2)至少进行3个月的血液透析治疗;(3)每2周进行≥5次的血液透析治疗;(4)言语正常,具备读写能力,自愿参加,知情同意。排除标准:(1)患严重心脑血管疾病(纽约心脏病协会心功能分级为Ⅳ级);(2)意识障碍,存在精神疾病,不能配合调查。本研究类型为横断面调查研究,且已获取西安交通大学伦理委员会批准(2021538)。

1.2 方法

1.2.1 一般资料调查表 患者的基本情况包括年龄、性别、文化程度、在职状况、婚姻状况、家庭月收入、医疗费用等7个条目;疾病资料包括原发病因、并发症及个数、血液透析年限、透析频率等5个条目。

1.2.2 PA能力评估 采用Fix和Daughton发展的人类活动概况量表(human activity profile,HAP)进行测量。该量表由94项活动组成,按执行每项活动所需能量的升序排列,回答方式分别为“仍然在做这项活动”“已经停止做这项活动”“从未做过这项活动”。最大活动得分(maximum activity score,MAS)是依然在做的活动条目中耗氧量最大的相对应的条目值,校正活动得分(adjusted activity score,AAS)是MAS减去MAS相对应的条目之前“已经停止做这项活动”的条目个数所得到的差值。MAS代表患者正在进行的最大耗氧量的PA,AAS代表患者PA能力。根据得分研究对象被分为以下3个PA水平:低PA水平(<53分),中等PA水平(53~74分)和PA水平活跃(>74分)[10]。Fix和Daughton报道MAS和AAS的Cronbach's α系数分别是0.84和0.79。

1.3 统计学处理

建立EpiData3.0数据库,双人独立录入数据,采用SPSS 26.0软件进行数据分析。符合正态分布的计量资料用均数±标准差($\bar{x}\pm s$)表示,两组间比较采用独立样本t检验,多组间比较采用方差分析;非正态分布的计量资料采用中位数(四分位数间距)[$M(Q_1,Q_3)$]表示,两组间比较采用Mann-Whitney U检验,多组间比较采用Kruskal-Wallis H检验,多重比较采用Bonferroni法校正显著性水平。计数资料用例数(百分率)表示,采用χ^2检验,多重比较采用Bonferroni法校正显著性水平。采用多元logistic回归分析中老年血液透析患者PA的影响因素。$P<0.05$为差异有统计学意义。

2 结 果

2.1 患者一般资料

本研究共发放问卷 315 份,其中有效问卷 305 份(96.82%)。在 MAS 分组中,低 PA 组 2 例(0.65%),中 PA 组 210 例(65.85%),活跃 PA 组 93 例(30.50%),因低 PA 组样本与其他组样本数相差较大,影响统计学分析结果,所以进行分析时剔除该部分样本。在 AAS 分组中,低 PA 组 89 例(29.18%),中 PA 组 180 例(59.02%),活跃 PA 组 36 例(11.80%)。

2.2 影响患者 PA 的单因素分析

在 MAS 得分分组中,不同性别、年龄、文化程度、在职状况的患者,不同 PA 水平间的差异有统计学意义($P<0.05$;表 1)。在 AAS 分组中,不同年龄、文化程度、在职状况、并发症个数、患糖尿病的患者,不同 PA 水平间的差异有统计学意义($P<0.05$;表 2)。

表 1 影响中老年血液透析患者 MAS 的单因素分析

Table 1 Univariate analysis of influencing factors of MAS in middle-aged and elderly patients with HD

Item	Moderate PA group($n=210$)	Active PA group($n=93$)	χ^2/Z	P value
Gender[n(%)]			4.008	0.045
Male	131(62.10)	69(74.20)		
Female	79(37.90)	24(25.80)		
Age[years, $M(Q_1, Q_3)$]	60(54,67)	56(48,62)	−3.925	<0.001
Education level[n(%)]			4.213	0.040
Junior high school and below	60(28.60)	15(16.20)		
Senior high school and above	150(71.40)	78(83.80)		
Marriage[n(%)]			2.359	0.302
Unmarried	5(2.40)	1(1.10)		
Married	187(89.00)	88(94.60)		
Others	18(8.60)	4(4.30)		
Working status[n(%)]			8.357	0.015
Employed	42(20.00)	33(35.50)		
Retired	42(20.00)	14(15.00)		
Unemployed	126(60.00)	46(49.50)		
Family monthly income[n(%)]			2.761	0.097
≥5 000 yuan	121(57.60)	44(47.30)		
<5 000 yuan	89(42.40)	49(52.70)		
Medical payment methods[n(%)]			3.756	0.153
Self-paying	1(0.50)	3(3.20)		
Medical insurance	207(98.50)	89(95.70)		
Free medical service	2(1.00)	1(1.10)		
Medical expenses[n(%)]			3.929	0.051
<2 000 yuan	95(45.24)	54(58.06)		
≥2 000 yuan	115(54.76)	39(41.94)		
Cause[n(%)]			2.081	0.721
Diabetic nephropathy	41(19.50)	18(19.40)		
Glomerulus nephritis	63(30.00)	23(24.70)		
Hypertensive nephropathy	38(18.10)	19(20.40)		
Others	18(8.60)	12(12.90)		
Unclear cause	50(23.80)	21(22.60)		
Number of complications[n(%)]			7.501	0.058
0	13(6.20)	8(8.60)		
1	74(35.20)	38(40.86)		
2	75(35.70)	38(40.86)		
3 and above	48(22.90)	9(9.68)		
Complication[n(%)]				
Diabetes mellitus	83(39.50)	34(36.60)	0.239	0.625
Hypertension	180(85.70)	76(81.70)	0.784	0.376
Congestive heart failure	34(16.20)	9(9.70)	2.245	0.134
Ischemic heart disease	21(10.00)	4(4.30)	2.765	0.096
Duration of HD[months, $M(Q_1, Q_3)$]	54(25,94)	58(26,102)	−0.060	0.952
Frequency of HD[n(%)]			0.719	0.397
Three times a week	62(29.50)	32(34.40)		
Five times every two weeks	148(70.50)	61(65.60)		

PA: physical activity; MAS: maximum activity score; HD: hemodialysis.

表2 影响中老年血液透析患者AAS的单因素分析

Table 2 Univariate analysis of influencing factors of AAS in middle-aged and elderly patients with HD

Item	Low PA group (n=89)	Moderate PA group (n=180)	Active PA group (n=36)	χ^2/H	P value
Gender[n(%)]				3.570	0.168
Male	52(29.50)	124(39.80)	26(72.20)		
Female	37(70.50)	56(60.20)	10(27.80)		
Age[years, $M(Q_1, Q_3)$]	62(56,67)	58(51,66)*	54(46,64)*#	8.232	<0.001
Education level[n(%)]				6.296	0.044
Junior high school and below	60(67.40)	94(52.20)	18(50.00)		
Senior high school and above	29(32.60)	86(47.80)	18(50.00)		
Marriage[n(%)]				4.616	0.329
Unmarried	1(1.12)	5(2.78)	0(0.00)		
Married	78(87.68)	165(91.67)	34(94.40)		
Others	10(11.20)	10(5.55)	2(5.60)		
Working status[n(%)]				11.372	0.023
Employed	12(13.50)	51(28.33)*	12(33.30)*		
Retired	14(15.70)	35(19.45)	7(19.50)		
Unemployed	63(70.80)	94(52.22)*	17(47.20)*		
Family monthly income[n(%)]				2.351	0.309
≥5 000 yuan	54(60.70)	95(59.50)	17(50.60)		
<5 000 yuan	35(39.30)	85(40.50)	19(49.40)		
Medical payment methods[n(%)]				3.710	0.447
Self-paying	1(1.12)	2(1.11)	1(2.78)		
Medical insurance	88(98.88)	175(97.22)	35(97.22)		
Free medical service	0(0.00)	3(1.67)	0(0.00)		
Medical expenses[n(%)]				0.007	0.934
<2 000 yuan	48(53.93)	80(44.44)	23(63.89)		
≥2 000 yuan	41(46.07)	100(55.56)	13(36.11)		
Cause[n(%)]				12.264	0.140
Diabetic nephropathy	19(21.35)	32(17.78)	8(22.20)		
Glomerulus nephritis	36(40.45)	45(25.00)	7(19.40)		
Hypertensive nephropathy	13(14.61)	36(20.00)	8(22.20)		
Others	8(8.98)	19(10.55)	3(8.30)		
Unclear cause	13(14.61)	48(26.67)	10(27.67)		
Number of complications[n(%)]				22.410	0.001
0	6(6.70)	13(7.20)	2(5.55)		
1	22(24.70)	68(37.80)	22(61.10)*#		
2	33(37.10)	71(39.40)	10(27.80)		
3 and above	28(31.50)	28(15.60)*	2(5.55)*		
Complication[n(%)]					
Diabetes mellitus	53(59.60)	66(36.70)*	10(28.80)*	16.303	<0.001
Hypertension	72(80.90)	155(86.10)	31(86.10)	1.314	0.518
Congestive heart failure	15(16.90)	25(13.90)	3(8.30)	1.552	0.460
Ischemic heart disease	6(6.70)	17(9.40)	3(5.60)	0.957	0.620
Duration of HD[months, $M(Q_1, Q_3)$]	59(26,106)	48.5(23.5,85)	69.5(30.5,117.5)	2.246	0.087
Frequency of HD[n(%)]				3.723	0.155
Three times a week	24(27.00)	55(30.60)	16(44.40)		
Five times every two weeks	65(73.00)	125(69.40)	20(55.60)		

PA: physical activity; AAS: adjusted activity score; HD: hemodialysis. Compared with low PA level group, *P<0.05; compared with moderate PA level group, #P<0.05;

2.3 影响患者 PA 的多元 logistic 回归分析

将单因素分析中有意义的指标纳入多因素 logistic 回归模型。结果发现,以 MAS 分级为因变量的回归模型中,年龄、性别、文化程度初中及以下是 PA 影响因素($P<0.05$;表 3);在以 AAS 分级为因变量的回归模型中,年龄、性别、退休/病退、患糖尿病、并发症个数为 2 个是 PA 的影响因素($P<0.05$;表 4)。

3 讨 论

本研究中,根据 MAS 得分划分的低 PA 水平组仅包含两例患者;但是,根据 AAS 得分划分的分组中,低 PA 水平人数比例高达 11.8%,这说明患者虽然 PA 最大水平能够达到中等水平,但是其身体能力提示患者的 PA 水平仍处于受损状态。这提示未来的研究和干预中不能仅观察患者尽自己最大努力完成的项目,而应重视患者的能力上限[11]。

本研究中,年龄、性别、文化程度、在职情况、患糖尿病以及并发症为两个是影响患者 PA 的影响因素。患者 PA 水平的高低与年龄有关。其他研究的结果也支持本研究发现[12]。老年血液透析患者除受疾病的影响外,肌肉萎缩程度和心肺功能也会明显下降,进而导致躯体功能下降,因此其低 PA 水平的患者平均年龄高于高 PA 水平的患者[13,14]。男性患者的 PA 优于女性,这说明即使受到相同病情和治疗影响,男性患者的 PA 水平损伤程度相比女性患者而言仍然较轻;在未来的临床工作中,医护人员应该重视女性血液透析患者的 PA 水平,可根据患者的自身特点,给予有针对性的活动建议,如散步、跳舞、做操等,以保持其 PA 能力和水平。患者 PA 水平与文化程度有关,文化程度越高的患者,PA 水平越高,这与国内外研究的结果一致[15]。分析原因,可能主要因为文化程度较高的患者对疾病以及运动相关知识掌握的情况较好,树立了对运动的正确认知,只有相信运动是有益的,才能以更积极的态度参与运动,提高其 PA 水平[16]。

患者 PA 水平均与患并发症有关。患者并发症个数越多,其 PA 越不活跃。其中,合并糖尿病比例在高、中、低 PA 水平组中逐渐升高。既往调查结果也提示,血液透析患者的合并症个数较多,其 PA 水平

表 3 多元 logistic 回归分析中老年血液透析患者 MAS 的影响因素

Table 3 Multivariate logistic regression analysis on influencing factors of MAS in middle-aged and elderly patients with HD

Item	β	SE	$Wald\ \chi^2$	OR(95%CI)	P value
Age	−0.062	0.016	14.934	0.940(0.910−0.969)	0.007
Gender					
Male	0.603	0.287	4.422	1.828(1.042−3.206)	0.035
Female					
Education level					
Junior high school and below	−0.723	0.330	4.793	0.485(0.254−0.927)	0.029
Senior high school and above					

MAS: maximum activity score; HD: hemodialysis.

表 4 多元 logistic 回归分析中老年血液透析患者 AAS 的影响因素

Table 4 Multivariate logistic regression analysis on influencing factors of AAS in middle-aged and elderly patients with HD

Item	β	SE	$Wald\ \chi^2$	OR(95%CI)	P value
Age	−0.042	0.019	4.959	0.959(0.924−0.995)	0.026
Gender					
Male	0.578	0.270	4.578	1.782(1.050−3.028)	0.032
Female					
Working status					
Employed	0.259	0.368	0.497	1.296(0.631−2.664)	0.481
Retired	−0.970	0.446	4.724	0.379(0.158−0.909)	0.030
Unemployed					
Number of complications					
1	0.434	0.535	0.659	1.543(0.541−4.406)	0.417
2	−1.139	0.468	5.937	0.320(0.128−0.800)	0.015
3 and above	−0.302	0.571	0.281	0.739(0.241−2.261)	0.596
0					
Diabetes mellitus	−0.556	0.258	4.647	0.573(−1.062−−0.050)	0.031

AAS: adjusted activity score; HD: hemodialysis.

越低[17, 18]，并且糖尿病肾病患者的中等强度以上的PA影响程度会比其他病的患者更严重[19]。糖尿病会导致周围神经系统病变如手脚麻痹及阵痛，视网膜病变也会使得患者视线模糊，这些并发症严重干扰了患者的日常生活能力[20]，高血压、心脏病等多个合并症会产生叠加效果，因此，患者的并发症越多，就会越刻意避免运动，故其PA水平低，临床应对合并糖尿病的患者进行运动行为管理，预防低PA带来的负面影响。

综上，中老年维持性血液透析患者处于中等PA水平，MAS评分和AAS评分从不同角度反映患者的PA状态和能力。临床医护人员需早期发现和针对性地对中老年人的低PA状态进行干预，预防不良结局发生。本研究的不足之处在于样本量较小，仅采用问卷测评方式评估患者的PA能力，未来还需加入客观测量指标，进一步完善研究。

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