·临床研究·

体重指数和腹围指数对缺血性卒中部位和病因的影响

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【摘要】 **目的** 探讨体重指数(BMI)和腹围指数(AGI)对缺血性卒中部位和病因的影响,以判断二者能否预测缺血性卒中病因和发病机制。**方法** 共185例急性缺血性卒中患者和性别、年龄、既往史相匹配的155例正常对照者,测量身高和体重并计算体重指数,测量腹围并计算腹围指数,进行英国牛津郡社区脑卒中项目(OCSP)分型和TOAST分型。**结果** 缺血性卒中患者超重(BMI 24.00~27.90 kg/m^2)亚组(t=2.060,P=0.000)和肥胖(BMI≥28 kg/m^2)亚组(t=2.315,P=0.000)体重指数均高于正常对照者,腹围异常(AGI>1 cm/kg)亚组腹围指数高于正常对照者(t=1.021,P=0.000)。185例急性缺血性卒中患者据OCSP分型分为完全前循环梗死型(TACI型)10例(5.41%)、部分前循环梗死型(PACI型)81例(43.78%)、腔隙性梗死型(LACI型)56例(30.27%)和后循环梗死型(POCI型)38例(20.54%);不同体重指数患者仅PACI型比例差异有统计学意义(H=7.041,P=0.011),24.00~27.90 kg/m^{2}亚组PACI型比例高于<18.50 kg/m^{2}亚组(Z=4.823,P=0.028)、18.50~23.90 kg/m^{2}亚组(Z=3.157,P=0.026)和≥28 kg/m^{2}亚组(Z=2.076,P=0.015);不同腹围指数患者仅POCI型比例>1 cm/kg亚组高于≤1 cm/kg亚组(χ^2=6.624,P=0.010)。据TOAST分型分为大动脉粥样硬化型(LAA型)59例(31.89%)、小动脉闭塞型(SAO型)57例(30.81%)、心源性栓塞型(CE型)32例(17.30%)、其他明确病因型(SOE型)17例(9.19%)和不明病因型(SUE型)20例(10.81%);不同体重指数患者LAA型(H=21.597,P=0.000)和SAO型(H=29.908,P=0.000)比例差异具有统计学意义,其中,≥28 kg/m^{2}亚组LAA型比例高于<18.50 kg/m^{2}亚组(Z=9.263,P=0.020)、18.50~23.90 kg/m^{2}亚组(Z=18.780,P=0.000)和24.00~27.90 kg/m^{2}亚组(Z=6.817,P=0.009),18.50~23.90 kg/m^{2}亚组SAO型比例高于<18.50 kg/m^{2}亚组(Z=7.404,P=0.007)、24.00~27.90 kg/m^{2}亚组(Z=22.849,P=0.000)以及≥28 kg/m^{2}亚组(Z=12.025,P=0.001);不同腹围指数患者>1 cm/kg亚组LAA型比例高于(χ^2=11.461,P=0.001)、SOE型比例低于(χ^2=4.558,P=0.033)≤1 cm/kg亚组。**结论** 体重指数和腹围指数均可以影响缺血性卒中部位和病因,可以用于预测缺血性卒中病因和发病机制。

【关键词】 卒中; 脑缺血; 体重; 腹部; 人体测量术

Effect of body mass index and abdominal girth index on location and etiology of ischemic stroke

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【**Abstract**】 **Objective** To investigate the influence of body mass index (BMI) and abdominal girth index (AGI) on the location and etiology of ischemic stroke in order to determine whether they can predict

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the etiology and pathogenesis of ischemic stroke. **Methods** A total of 185 patients with acute ischemic stroke and 155 cases of normal controls matched in sex, age and past medical history were enrolled in this study. Their height and weight were measured to calculate BMI, and abdominal circumference was measured to calculate AGI. Oxfordshire Community Stroke Project (OCSP) and TOAST classification were carried out. **Results** BMI of overweight (BMI 24.00–27.90 kg/m^2) subgroup (t = 2.060, P = 0.000) and obesity (BMI ≥ 28 kg/m^2) subgroup (t = 2.315, P = 0.000) in patients with ischemic stroke was significantly higher than that in control group. AGI of abnomaly (AGI > 1 cm/kg) subgroup in patients with ischemic stroke was significantly higher than that in control group (t = 1.021, P = 0.000). Based on OCSP classification, 185 patients with ischemic stroke were classified into 10 (5.41%) of total anterior circulation infarct (TACI), 81 (43.78%) of partial anterior circulation infarct (PACI), 56 (30.27%) of lacunar infarct (LACI) and 38 (20.54%) of posterior circulation infarct (POCI). Only the PACI ratio among different BMI subgroups had statistical significance (H = 7.041, P = 0.011). PACI ratio in BMI 24.00–27.90 kg/m^2 subgroup was significantly higher than that in BMI < 18.50 kg/m^2 subgroup (Z = 4.823, P = 0.028), 18.50–23.90 kg/m^2 subgroup (Z = 3.157, P = 0.026) and ≥ 28 kg/m^2 subgroup (Z = 2.076, P = 0.015). In AGI subgroups, only POCI ratio in AGI > 1 cm/kg subgroup was significantly higher than that in AGI ≤ 1 cm/kg subgroup (χ^2 = 6.624, P = 0.010). In TOAST classification, 185 patients with ischemic stroke were classified into 59 (31.89%) of large artery atherosclerosis (LAA), 57 (30.81%) of small artery occlusion (SAO), 32 (17.30%) of cardioembolism (CE), 17 (9.19%) of stroke of other determined etiology (SOE) and 20 (10.81%) of stroke of undetermined etiology (SUE). LAA ratio (H = 21.597, P = 0.000) and SAO ratio (H = 29.908, P = 0.000) among different BMI subgroups had statistical significance. LAA ratio in BMI ≥ 28 kg/m^2 subgroup was significantly higher than that in < 18.50 kg/m^2 subgroup (Z = 9.263, P = 0.020), 18.50–23.90 kg/m^2 subgroup (Z = 18.780, P = 0.000) and 24.00–27.90 kg/m^2 subgroup (Z = 6.817, P = 0.009). SAO ratio in BMI 18.50–23.90 kg/m^2 subgroup was significantly higher than that in < 18.50 kg/m^2 subgroup (Z = 7.404, P = 0.007), 24.00–27.90 kg/m^2 subgroup (Z = 22.849, P = 0.000) and ≥ 28 kg/m^2 subgroup (Z = 12.025, P = 0.001). In AGI subgroups, LAA ratio in > 1 cm/kg subgroup was significantly higher (χ^2 = 11.461, P = 0.001), while SOE ratio was significantly lower (χ^2 = 4.558, P = 0.033) than that in AGI ≤ 1 cm/kg subgroup. **Conclusions** BMI and AGI can influence the location and etiology of ischemic stroke, which can be used to predict the etiology and pathogenesis of ischemic stroke.

【Key words】 Stroke; Brain ischemia; Body weight; Abdomen; Anthropometry

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缺血性卒中发病率、病死率和复发率均较高，给个人、家庭和社会带来沉重负担。明确缺血性卒中病因和发病机制是治疗和预防复发的关键，因此，探寻一种简便、易行的方法以尽早明确缺血性卒中的病因和发病机制，有利于早期治疗。体重指数（BMI）和腹围指数（AGI）与高血压、糖尿病、冠心病等缺血性卒中相关危险因素直接相关，且二者计算简便、易于操作，鉴于此，本研究选择体重指数和腹围指数作为测量指标，探讨其对缺血性卒中部位和病因的影响，判断二者能否预测缺血性卒中病因和发病机制，以为临床早期治疗提供依据。

资料与方法

一、临床资料

1. 纳入标准 （1）急性缺血性卒中的诊断符合《中国急性缺血性脑卒中诊治指南2010》[1]：急性起病（发病至入院时间 < 48 h）；存在局灶性或全面性神经功能缺损；临床症状与体征持续数小时以上；头部CT和（或）MRI可见责任梗死灶。（2）首次发作。（3）本研究经天津市北辰医院道德伦理委员会审核批准，所有受试者或其家属均知情同意并签署知情同意书。

2. 排除标准 （1）发病至入院时间 ≥ 48 h的患者。（2）非首次发作的缺血性卒中患者。（3）颅脑创伤导致的继发性缺血性卒中患者。（4）继发性高血压患者。（5）目前参加其他临床试验的患者。（6）发生出血性转化（HT）的患者。

3. 一般资料 （1）缺血性卒中组：选择天津市北辰医院神经内科2014年1月–2015年12月住院治疗的急性缺血性卒中患者共185例，男性90例，女性95例；年龄38～78岁，平均（68.52 ± 10.21）岁；发病至入院时间1～48 h，平均（12.25 ± 2.56）h；既往有高血压103例（55.68%）、糖尿病23例（12.43%）、冠心病41例（22.16%）、心房颤动9例（4.86%）、高脂血症

56例(30.27%),吸烟56例(30.27%)、饮酒34例(18.38%)。(2)正常对照组(对照组):选择同期在我院进行体格检查的健康志愿者155例,男性87例,女性68例;年龄38~75岁,平均(65.94±8.43)岁;既往有高血压86例(55.48%)、糖尿病16例(10.32%)、冠心病25例(16.13%)、心房颤动5例(3.23%)、高脂血症45例(29.03%),吸烟35例(22.58%)、饮酒30例(19.35%)。两组受试者性别、年龄和既往史比较,差异均无统计学意义($P>0.05$,表1),具有可比性。

二、研究方法

1.体重指数和腹围指数的测量 (1)体重指数的测量:嘱受试者脱鞋、轻便衣装,测量身高(精确至0.50 cm)和体重(精确至0.50 kg),并计算体重指数,计算公式为体重指数(kg/m^2)=体重(kg)/身高(m)^2。参照《中国成人超重与肥胖症预防与控制指南(节录)》[2]推荐的标准,<18.50 kg/m^2,体重过轻;18.50~23.90 kg/m^2,体重正常;24.00~27.90 kg/m^2,超重;≥28 kg/m^2,肥胖。(2)腹围指数的测量:于餐后2 h嘱受试者站立位,着单衣、松裤带,平和呼吸,以皮尺平脐部绕腹部测量腹围(精确至0.10 cm),并计算腹围指数,计算公式为腹围指数(cm/kg)=实际测量腹围(cm)/[0.54×体重(kg)×41.70],参照《中国人理想腹围的推定及腹围指数的建立》[3]推荐的标准,>1 cm/kg为腹围异常。

2.缺血性卒中的分型 (1)按照部位分型:参照英国牛津郡社区脑卒中项目(OCSP)分型[4],分为完全前循环梗死型(TACI型)、部分前循环梗死型(PACI型)、腔隙性梗死型(LACI型)和后循环梗死型(POCI型)共4种亚型。(2)按照病因分型:参照TOAST分型[5],分为大动脉粥样硬化型(LAA型)、心源性栓塞型(CE型)、小动脉闭塞型(SAO型)、其他明确病因型(SOE型)和不明病因型(SUE型)共计5种亚型。

三、统计分析方法

本组数据采用SPSS 16.0统计软件进行处理与分析。计数资料以相对数构成比(%)或率(%)表示,采用χ^2检验或校正χ^2检验;呈正态分布的计量资料以均数±标准差($\bar{x}\pm s$)表示,采用两独立样本的t检验。不同体重指数亚组缺血性卒中分型的比较,采用Kruskal-Wallis秩和检验(H检验),两两比较行秩和检验;不同腹围指数亚组缺血性卒中分型的比较,采用秩和检验。以$P\leq 0.05$为差异具有统计学意义。

表1 两组受试者一般资料的比较

Table 1. Comparison of general data between 2 groups

Item	Control (N=155)	Ischemic stroke (N=185)	χ^2 or t value	P value
Sex [case (%)]			1.891	0.197
Male	87 (56.13)	90 (48.65)		
Female	68 (43.87)	95 (51.35)		
Age ($\bar{x}\pm s$, year)	65.94±8.43	68.52±10.21	0.386	0.095
Hypertension [case (%)]	86 (55.48)	103 (55.68)	0.035	0.972
Diabetes [case (%)]	16 (10.32)	23 (12.43)	0.607	0.545
Coronary heart disease [case (%)]	25 (16.13)	41 (22.16)	1.416	0.158
Atrial fibrillation [case (%)]	5 (3.23)	9 (4.86)	0.756	0.450
Hyperlipidemia [case (%)]	45 (29.03)	56 (30.27)	0.248	0.804
Smoking [case (%)]	35 (22.58)	56 (30.27)	1.610	0.108
Drinking [case (%)]	30 (19.35)	34 (18.38)	0.229	0.819

Two-independent-simple t test for comparison of age, and χ^2 test for comparison of others

结 果

一、体重指数和腹围指数的比较

根据体重指数,两组受试者分为体重过轻(<18.50 kg/m^2)、体重正常(18.50~23.90 kg/m^2)、超重(24.00~27.90 kg/m^2)和肥胖(≥28 kg/m^2)4个亚组,24.00~27.90 kg/m^{2}亚组($P=0.000$)和≥28 kg/m^{2}亚组($P=0.000$)缺血性卒中患者体重指数均高于正常对照者且差异具有统计学意义,而<18.50 kg/m^{2}亚组和18.50~23.90 kg/m^{2}亚组缺血性卒中患者与正常对照者体重指数差异无统计学意义(均$P>0.05$,表2)。根据腹围指数,两组受试者分为腹围正常(≤1 cm/kg)和腹围异常(>1 cm/kg)2个亚组,其中,>1 cm/kg亚组缺血性卒中患者腹围指数高于正常对照者且差异具有统计学意义($P=0.000$),而≤1 cm/kg亚组缺血性卒中患者与正常对照者腹围指数差异无统计学意义($P>0.05$,表3)。

二、体重指数和腹围指数对缺血性卒中分型的影响

1.体重指数和腹围指数对OCSP分型的影响 本组185例急性缺血性卒中患者根据OCSP分型,可以分为TACI型10例(5.41%)、PACI型81例(43.78%)、LACI型56例(30.27%)和POCI型38例(20.54%)。不同体重指数亚组患者OCSP分型相比较,仅PACI型比例差异具有统计学意义($P=0.011$),其中24.00~27.90 kg/m^{2}亚组PACI型比例高

表2 不同体重指数亚组缺血性卒中患者与正常对照者体重指数的比较($\bar{x} \pm s$, kg/m^2)

Table 2. Comparison of BMI between ischemic stroke and control groups among different BMI subgroups ($\bar{x} \pm s$, kg/m^2)

Subgroup	Control		Ischemic stroke		t value	P value
	N	BMI	N	BMI		
BMI < 18.50 kg/m^2	21	17.34 ± 5.16	22	16.34 ± 2.86	5.341	0.126
BMI 18.50–23.90 kg/m^2	55	21.43 ± 4.56	62	20.19 ± 3.24	8.536	1.221
BMI 24.00–27.90 kg/m^2	74	25.17 ± 3.44	86	29.48 ± 4.57	2.060	0.000
BMI ≥ 28.00 kg/m^2	5	34.11 ± 3.47	15	41.24 ± 5.12	2.315	0.000

BMI, body mass index, 体重指数

表3 不同腹围指数亚组缺血性卒中患者与正常对照者腹围指数的比较($\bar{x} \pm s$, cm/kg)

Table 3. Comparison of AGI between ischemic stroke and control groups among different AGI subgroups ($\bar{x} \pm s$, cm/kg)

Subgroup	Control		Ischemic stroke		t value	P value
	N	AGI	N	AGI		
AGI ≤ 1 cm/kg	64	0.69 ± 0.18	56	0.67 ± 0.05	4.256	0.514
AGI > 1 cm/kg	91	1.21 ± 0.01	129	1.54 ± 0.11	1.021	0.000

AGI, abdominal girth index, 腹围指数

于 < 18.50 kg/m^2 亚组($Z = 4.823$, $P = 0.028$)、18.50 ~ 23.90 kg/m^2 亚组($Z = 3.157$, $P = 0.026$)和 ≥ 28 kg/m^2 亚组($Z = 2.076$, $P = 0.015$);而TACI型、LACI型和POCI型比例组间差异未达到统计学意义(均 $P > 0.05$,表4)。不同腹围指数亚组患者OCSP分型比较,> 1 cm/kg亚组仅POCI型比例高于 ≤ 1 cm/kg亚组且差异具有统计学意义($P = 0.010$),而TACI型、PACI型和LACI型比例组间差异无统计学意义(均 $P > 0.05$,表4)。

2. 体重指数和腹围指数对TOAST分型的影响 本组185例急性缺血性卒中患者根据TOAST分型,可以分为LAA型59例(31.89%)、SAO型57例(30.81%)、CE型32例(17.30%)、SOE型17例(9.19%)和SUE型20例(10.81%)。不同体重指数亚组患者TOAST分型相比较,LAA型($P = 0.000$)和SAO型($P = 0.000$)比例差异具有统计学意义,其中,≥ 28 kg/m^2 亚组LAA型比例高于 < 18.50 kg/m^2 亚组($Z = 9.263$, $P = 0.020$)、18.50 ~ 23.90 kg/m^2 亚组($Z = 18.780$, $P = 0.000$)和 24.00 ~ 27.90 kg/m^2 亚组($Z = 6.817$, $P = 0.009$),18.50 ~ 23.90 kg/m^2 亚组SAO型比例高于 < 18.50 kg/m^2 亚组($Z = 7.404$, $P = 0.007$)、24.00 ~ 27.90 kg/m^2 亚组($Z = 22.849$, $P = 0.000$)和 ≥ 28 kg/m^2 亚组($Z = 12.025$, $P = 0.001$);而CE型、SOE型和SUE型比例组间差异无统计学意义(均 $P > 0.05$,表5)。不同腹围指数亚组患者TOAST分型比较,> 1 cm/kg亚组LAA型比例高于($P = 0.001$)、SOE型比例低于($P = 0.033$) ≤ 1 cm/kg亚组且差异具有统计学意义,而SAO型、CE型和SUE型比例组间差异无统计学意义(均 $P > 0.05$,表5)。

讨 论

体重指数是与体内脂肪总量密切相关的指标,综合考虑身高和体重两项因素,该项指标简便、实用,可以反映出超重和肥胖,在评价机体因超重而面临高血压、糖尿病、心脏病等风险时,较单纯测量体重更准确[6]。但体重指数作为反映超重或肥胖的公认指标,不能特异性反映向心性肥胖,而向心性肥胖对健康的危害更显著[7]。目前关于向心性肥胖的研究多采用腹围指数,但该项指标目前尚无统一标准。因此,本研究以体重指数作为主要指标,同时计算腹围指数,从两方面明确二者对缺血性卒中部位和病因的影响。多项流行病学调查和临床试验显示,体重指数和腹围指数与高血压、糖尿病、心血管病、高脂血症等缺血性卒中相关危险因素有关[8-11]。脑卒中肥胖患者血清脂质、血糖、血清尿酸、血浆同型半胱氨酸和血液黏稠度均显著升高[12-14]。不同于传统脑血管病危险因素,如性别、年龄、种族、高血压、糖尿病、心脏病、高脂血症、吸烟、饮酒等,体重指数和腹围指数是否为脑血管病的独立危险因素,目前观点尚不一致。中国肥胖问题工作组数据汇总分析协作组[15]的报告指出,超重和肥胖是冠心病和缺血性卒中的独立危险因素。本研究结果显示,体重指数和腹围指数均可以影响缺血性卒中患者OCSP和TOAST分型,然而尚待大样本临床研究的进一步证实。

对缺血性卒中的认识经历从"疾病"到"临床综合征"的深入过程,并基于病因进行"对因治疗",这一过程随着缺血性卒中病因学研究的发展而不断深入。因此,根据缺血性卒中部位和病因分型,对预防与治疗缺血性卒中意义重大。OCSP分型是1988年Bamford等[16]对英国牛津郡大规模缺血性卒中患者进行调查而提出的新分型,该分型特点与解剖学和病理生理学过程相对应,最显著优点是,简便易行,不依赖辅助检查结果,在CT和(或)MRI尚

表4 不同亚组缺血性卒中患者OCSP分型的比较[例(%)]

Table 4. Comparison of OCSP subtypes of ischemic stroke in different subgroups [case (%)]

Subgroup	N	TACI	PACI	LACI	POCI
BMI (kg/m^2)					
< 18.50	22	2 (9.09)	6 (27.27)	8 (36.36)	6 (27.27)
18.50–23.90	62	5 (8.06)	24 (38.71)	18 (29.03)	15 (24.19)
24.00–27.90	86	2 (2.33)	46 (53.49)	24 (27.91)	14 (16.28)
≥ 28.00	15	1 (6.67)	5 (33.33)	6 (40.00)	3 (20.00)
H value		3.084	7.041	1.332	2.070
P value		0.379	0.011	0.721	0.558
AGI (cm/kg)					
≤ 1	56	1 (1.78)	25 (44.64)	12 (21.43)	18 (32.14)
> 1	129	9 (6.98)	56 (43.41)	44 (34.11)	20 (15.50)
χ^2 value		1.168*	0.240	2.974	6.624
P value		0.280	0.877	0.085	0.010

*adjusted χ^2 value。BMI, body mass index, 体重指数; AGI, abdominal girth index, 腹围指数; TACI, total anterior circulation infarct, 完全前循环梗死; PACI, partial anterior circulation infarct, 部分前循环梗死; LACI, lacunar infarct, 腔隙性梗死; POCI, posterior circulation infarct, 后循环梗死

表5 不同亚组缺血性卒中患者TOAST分型的比较[例(%)]

Table 5. Comparison of TOAST subtypes of ischemic stroke in different subgroups [case (%)]

Subgroup	N	LAA	SAO	CE	SOE	SUE
BMI (kg/m^2)						
< 18.50	22	7 (31.82)	5 (22.73)	4 (18.18)	4 (18.18)	2 (9.09)
18.50–23.90	62	9 (14.52)	35 (56.45)	8 (12.90)	6 (9.68)	4 (6.45)
24.00–27.90	86	32 (37.21)	16 (18.60)	18 (20.93)	7 (8.14)	13 (15.12)
≥ 28.00	15	11 (73.33)	1 (6.67)	2 (13.33)	0 (0.00)	1 (6.67)
H value		21.597	29.908	1.844	4.732	3.274
P value		0.000	0.000	0.606	0.193	0.351
AGI (cm/kg)						
≤ 1	56	8 (14.28)	22 (39.28)	8 (14.28)	9 (16.07)	9 (16.07)
> 1	129	51 (39.53)	35 (27.13)	24 (18.60)	8 (6.20)	11 (8.53)
χ^2 value		11.461	2.706	0.509	4.558	2.305
P value		0.001	0.100	0.475	0.033	0.129

BMI, body mass index, 体重指数; AGI, abdominal girth index, 腹围指数; LAA, large artery atherosclerosis, 大动脉粥样硬化; SAO, small artery occlusion, 小动脉闭塞; CE, cardioembolism, 心源性栓塞; SOE, stroke of other determined etiology, 其他明确病因; SUE, stroke of undetermined etiology, 不明病因

未发现病灶前即可根据临床表现迅速分型,并提示闭塞血管和梗死灶部位和大小,与影像学对应关系良好,同时具有较好的信度和效度,符合临床需求,可用于指导早期治疗[4,17]。本组185例急性缺血性卒中患者按照OCSP分型分为TACI型10例(5.41%)、PACI型81例(43.78%)、LACI型56例(30.27%)和POCI型38例(20.54%);不同体重指数患者仅PACI型比例差异有统计学意义,其中,24.00~27.90 kg/m^{2}亚组高于<18.50 kg/m^{2}亚组、18.50~23.90 kg/m^{2}亚组和≥28 kg/m^{2}亚组,而TACI型、LACI型和POCI型比例组间差异无统计学意义,提示体重指数为24.00~27.90 kg/m^{2}的缺血性卒中患者更易发生部分前循环梗死,而≥28 kg/m^{2}亚组OCSP分型与<18.50 kg/m^{2}亚组和18.50~24.90 kg/m^{2}亚组差异无统计学意义,考虑可能是样本量较小的原因;不同腹围指数患者仅POCI型比例>1 cm/kg亚组高于≤1 cm/kg亚组,TACI型、PACI型和LACI型比例组间差异则无统计学意义,提示缺血性卒中向心性肥胖患者更易发生后循环梗死。

20世纪90年代,Adams研究团队[5,18]在抗凝药Org 10172治疗急性缺血性卒中的临床试验中提出缺血性卒中病因分型即TOAST分型,根据临床表现、梗死灶大小和类型、影像学特点和辅助检查结果,分为LAA型、SAO型、CE型、SOE型和SUE型。TOAST分型是目前国际公认的首个缺血性卒中病因分型,其意义在于可以反映缺血性卒中病因和发病机制,从而为制定治疗方案和二级预防提供理论依据[19]。本组185例急性缺血性卒中患者按照TOAST分型分为LAA型59例(31.89%)、SAO型57例(30.81%)、CE型32例(17.30%)、SOE型17例(9.19%)和SUE型20例(10.81%)。不同体重指数患者TOAST分型比较,LAA型和SAO型比例差异具有统计学意义,其中,≥28 kg/m^{2}亚组患者LAA型比例高于<18.50 kg/m^{2}亚组、18.50~23.90 kg/m^{2}亚组和24.00~27.90 kg/m^{2}亚组,18.50~23.90 kg/m^{2}亚组SAO型比例高于<18.50 kg/m^{2}亚组、24.00~27.90 kg/m^{2}亚组和≥28 kg/m^{2}亚组,CE型、SOE型和SUE型比例组间差异无统计学意义,提示体重指数≥28 kg/m^{2}的缺血性卒中患者易发生大动脉粥样硬化,18.50~23.90 kg/m^{2}的患者更易发生小动脉闭塞;不同腹围指数患者>1 cm/kg亚组LAA型比例高于、SOE型比例低于≤1 cm/kg亚组,而SAO型、CE型和SUE型

比例组间差异无统计学意义，提示缺血性卒中向心性肥胖患者更易发生大动脉粥样硬化。随着生活习惯的改变和生活条件的改善，高脂饮食导致肥胖尤其是腹围指数异常的人群增多，更易发生大动脉粥样硬化，故LAA型风险明显高于其他人群。

综上所述，应重视对于肥胖的宣教和干预，控制体重有利于脑血管病相关危险因素的控制，从而降低脑卒中风险，对已发生缺血性卒中的患者，应尽早对体重指数和腹围指数异常患者行抗动脉粥样硬化治疗。

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