

doi: 10.13241/j.cnki.pmb.2018.20.041

颈围用于筛选糖调节受损人群的临床价值研究*

孙晓慧¹ 柳杰^{1△} 刘大娜¹ 张媛¹ 张艺颖¹ 宁萌¹ 赵梁君¹ 孙宏²

(1 哈尔滨市第一医院 内分泌四病房 黑龙江 哈尔滨 150010; 2 哈尔滨医科大学公共卫生学院 黑龙江 哈尔滨 150086)

摘要 目的:探讨颈围用于筛选糖调节受损人群的临床价值。**方法:**选取哈尔滨市第一医院 2017 年 3 月至 11 月收治的糖调节受损患者共 100 例,男性颈围以 38 cm 为临界值,女性以 35 cm 为临界值,分为颈围正常组和颈围异常组,比较两组患者空腹及餐后血糖、空腹胰岛素、糖化血红蛋白、总胆固醇、甘油三酯、低密度脂蛋白等相关指标水平,并分析颈围与以上指标的相关性。**结果:**颈围异常组患者的餐后 2 h 血糖、空腹胰岛素、糖化血红蛋白、总胆固醇、甘油三酯、低密度脂蛋白数值高于颈围正常组,尤以甘油三酯明显,高密度脂蛋白数值低于颈围正常组,差异有统计学意义($P<0.05$)。颈围与餐后 2 h 血糖、总胆固醇、甘油三酯、低密度脂蛋白水平呈正相关,差异均有统计学意义($P<0.05$),颈围与高密度脂蛋白水平呈负相关,差异均有统计学意义($P<0.05$)。**结论:**颈围可以作为临床预测、评估糖调节受损患者的早期指标,为早期社区筛查及诊断提供相关的参考依据。

关键词:颈围;糖调节受损;2 型糖尿病

中图分类号:R587.1 **文献标识码:**A **文章编号:**1673-6273(2018)20-3980-04

Analysis of the Clinical value of Neck Circumference for Screening the Patients with Impaired Glucose Regulation*

SUN Xiao-hui¹, LIU Jie^{1△}, LIU Da-na¹, ZHANG Yuan¹, ZHANG Yi-ying¹, NING Meng¹, ZHAO Liang-jun¹, SUN Hong²

(1 The Fourth Endocrine ward, The First Hospital of Harbin, Harbin, Heilongjiang, 150010, China;

2 College of Public Hygiene of Harbin Medical University, Harbin, Heilongjiang, 150086, China)

ABSTRACT Objective: To discuss the clinical value of neck circumference for the screening of impaired glucose regulation.

Methods: 100 patients with impaired glucose regulation were selected in the first hospital of Harbin from march to November 2017, the male neck circumference was a critical value of 38 cm, women are at 35 cm, the patients were divided into the normal group and the abnormal group, the levels of fasting and postprandial 2h blood glucose, fasting insulin, glycosylated hemoglobin, total cholesterol, triglycerides and low density lipoprotein were compared between the two groups, and the correlation between neck circumference and above indexes were analyzed. **Results:** The fasting blood glucose, postprandial 2 h blood glucose, fasting insulin, glycosylated hemoglobin, total cholesterol, triglyceride, low density lipoprotein in abnormal group were higher than those of the normal group ($P<0.05$). Neck circumference were positively correlated with the postprandial 2 h blood glucose, total cholesterol, triglyceride, low density lipoprotein ($P<0.05$), neck circumference was negatively correlated with the high density lipoprotein ($P<0.05$). **Conclusion:** Neck circumference can be used as an early indicator for the clinical prediction and assessment of patients with impaired glucose regulation, it provided relevant references for early community screening and diagnosis.

Key words: Neck circumference; Impaired glucose regulation; Type 2 Diabetes

Chinese Library Classification(CLC): R587.1 **Document code:** A

Article ID: 1673-6273(2018)20-3980-04

前言

随着人口老龄化和现代生活方式的改变,2 型糖尿病已成为危害人类身心健康的主要疾病之一,是继心血管疾病和肿瘤之后的第三大非传染性疾病,严重危害了社会的公共健康,导致公共卫生支出呈逐年增长的趋势。研究显示颈围(neck circumference, NC)与糖尿病患者超重^[1,2]、中心性肥胖^[1,3,4]和代谢综合征明显相关^[5-11],其作为评价糖调节受损人群患者内脏脂肪组织^[12]和胰岛素抵抗^[9,13]早期指标的有效性优于腰围^[14],是目

前首选的测量指标^[7,11,15]。

糖尿病以糖代谢紊乱为主要表现,糖调节受损(impaired glucose regulation, IGR)即糖尿病前期,是进展为糖尿病的早期异常表现,主要包括空腹血糖受损(impaired fasting glucose, IGT)和糖耐量减低(impaired glucose tolerance, IGT)。本研究旨在通过测量糖调节受损人群的颈围大小及相关糖、脂代谢指标探讨颈围与糖调节受损人群的相关性,以期及早发现糖尿病前期人群,并给予适当的药物干预及生活方式干预治疗,降低 2 型糖尿病的发病率。

* 基金项目:黑龙江省教育厅科技项目(12541351)

作者简介:孙晓慧(1984-),硕士,主治医师,主要研究方向:糖尿病及并发症的诊治,电话:0451-84883325, E-mail: sunxiaohui816@126.com

△ 通讯作者:柳杰,硕士,主任医师,主要研究方向:骨质疏松的诊治, E-mail: 13936311789@163.com

(收稿日期:2018-04-15 接受日期:2018-05-17)

1 对象与方法

1.1 研究对象

筛选哈尔滨市第一医院 2017 年 3 月至 11 月收治的糖调节受损患者共 100 例,包括男性 55 例,女性 45 例。入组标准:(1)年龄 ≥ 23 岁;(2)空腹血糖(FBG) <7.0 mmol/L 为空腹血糖受损 (IGR),口服葡萄糖耐量试验 (OGTT)2 小时血糖(PPG) >7.8 mmol/L 且 <11.1 mmol/L 为糖耐量减低(IGT);(3)排除甲状腺功能亢进、甲状腺瘤、肝、肾功能异常等;(4)血脂判断标准:根据《中国成人血脂异常防治指南》,血清总胆固醇 ≥ 5.18 mmol/L、甘油三酯 ≥ 1.70 mmol/L、LDL-C ≥ 3.37 mmol/L、HDL-C <1.04 mmol/L 诊断为血脂异常。所有入选人群签署知情同意书。

1.2 方法

测量入选人群血压、体重、身高、颈围;颈围测量方法:受试者呈垂直端坐位,平静呼吸,双眼平视前方,使用软皮尺紧贴喉结下缘、且垂直于颈部长轴测量颈部周径,精确到 0.1 cm;入选者禁食 12 h,肘静脉采血采用高效液相色谱法检测糖化血红蛋白(HbA1c)、采用葡萄糖氧化酶法检测空腹及餐后血糖(FBG、PPG),采用放射免疫法检测空腹胰岛素(FINS),采用氧化酶法测定血清总胆固醇(TC)及甘油三酯(TG),采用化学修饰酶法检测低密度脂蛋白(LDL-C)及高密度脂蛋白(HDL-C)。分组:测量入选人群颈围,男性以 38 cm 作为临界值,女性以 35 cm 作为临界值,将 100 名受试者分为 NC 正常组和 NC 异常组。NC 异常组患者共 51 例,包括男性 28 例,女性 23 例;NC 正常组患者共 49 例,包括男性 27 例,女性 22 例。比较 NC 正常组和 NC 异常组患者的年龄、性别差异无统计学意义($P>0.05$),见表 1。

表 1 NC 正常组与 NC 异常组的基本情况比较

Table 1 Comparison of the baseline information between normal and abnormal NC group

Group	Age	Sex(male/female)(n)
Normal NC (49)	50.5 $\pm$ 15.0	27/22
Abnormal NC (51)	51.1 $\pm$ 17.1	28/23

Note: Compared between normal and abnormal NC group, $P>0.05$.

1.3 统计学分析

本研究数据采用 SPSS 19.0 软件进行统计学分析,两样本均数比较采用 t 检验,以($\bar{x}\pm s$)表示,以 NC 为因变量,糖代谢、脂代谢指标为自变量,采用多元逐步回归法进行相关性检测,以 $P<0.05$ 为差异具有统计学意义。

2 结果

以临界值为准,NC 异常组患者血糖(空腹血糖、餐后 2 h

血糖)、空腹胰岛素、糖化血红蛋白数值高于 NC 正常组患者(见表 2),差异均有统计学意义($P<0.05$);NC 异常组患者的总胆固醇、甘油三酯、低密度脂蛋白数值高于 NC 正常组,尤以甘油三酯数值明显(见表 3),而高密度脂蛋白数值低于 NC 正常组,差异有统计学意义($P<0.05$)。以 NC 为因变量,糖代谢、脂代谢指标为自变量,采用 Pearson 和多元逐步回归法进行相关性分析,结果显示 NC 与 PPG、TC、TG、LDL-C 呈正相关,与 HDL-C 呈负相关($P<0.05$),见表 4、5。

表 2 NC 正常组与异常组糖代谢指标比较

Table 2 Comparison of the glucose metabolism between normal and abnormal NC group

Groups	FPG(mmol/L)	PPG(mmol/L)	FINS(pmol/L)	HbA 1c (%)
Normal NC	5.79 $\pm$ 1.01	7.49 $\pm$ 2.79	3.37 $\pm$ 1.42	5.9 $\pm$ 0.84
Abnormal NC	5.81 $\pm$ 1.18	7.99 $\pm$ 3.01	2.36 $\pm$ 1.12	6.20 $\pm$ 0.68

Note: Compared with normal NC group, $P<0.05$.

表 3 NC 正常组与异常组脂代谢指标比较

Table 3 Comparison of the lipid metabolism index between normal and abnormal NC group

Groups	TC(mmol/L)	TG (mmol/L)	LDL(mmol/L)	HDL(mmol/L)
Normal NC	5.16 $\pm$ 0.85	1.53 $\pm$ 0.70	2.62 $\pm$ 0.54	1.12 $\pm$ 0.17
Abnormal NC	6.46 $\pm$ 1.29	2.39 $\pm$ 0.76	3.71 $\pm$ 0.96	0.78 $\pm$ 0.13

Note: Compared with normal NC group, $P<0.05$.

3 讨论

随着人们生活水平的提高及生活方式的改变,超重、肥胖、胰岛素抵抗人群日益增加,随之引发的糖代谢、脂代谢人群逐渐增加,导致全球糖尿病发病率呈逐年上升的趋势。我国糖尿病发病率位居世界首位,迫切需要一项新的、无创性的检查方法筛查糖调节受损人群,为早期糖调节受损人群的诊断及治疗

提供依据。肥胖是代谢综合征及心血管疾病发病的危险因素,包括糖尿病、高血压病、高脂血症、冠心病等。颈围作为超重和肥胖的测量指标目前应用比较普遍,相比于其他代谢指标如 BMI、腰围,颈围的灵敏性及特异性均较高。临床上,通过 BMI 界定超重和肥胖,需要除外肌肉组织的影响,因此需要多项测量指标综合评估肥胖、超重及内脏脂肪组织。超重和肥胖人群的颈部脂肪组织增加,颈部脂肪含量与代谢综合征及游离脂肪

表 4 NC 与糖、脂代谢指标的相关性

Table 4 Correlation of NC with the glucose and lipid metabolism index

Variable	r	P
FPG	0.018	0.4989
PPG	0.022	0.0399
FINS	0.520	0.4910
HbA1c	0.126	0.4120
TC	0.038	0.0462
TG	0.082	0.0390
LDL	0.016	0.0471
HDL	-0.107	0.0001

表 5 NC 与糖、脂代谢指标的相关性

Table 5 Correlation of NC with the glucose and lipid metabolism index

Factor	Regression coefficient	Standard error	p
FPG	0.011	0.120	0.451
PPG	0.241	0.068	0.005
FINS	0.023	0.102	0.652
HbA1c	0.056	0.133	0.150
TC	0.179	0.030	0.044
TG	0.120	0.096	0.040
LDL	0.108	0.111	0.035
HDL	-0.155	0.107	0.042

酸有关,高水平的游离脂肪酸与氧化应激及胰岛素抵抗有关,继之影响人群的血糖水平。

大量临床研究及流行病学调查显示糖尿病发病与超重^[1,2]、中心性肥胖^[1,3,4]、胰岛素抵抗^[9,13]引发的糖、脂代谢紊乱有关,主要表现为老年男性和女性患者身体脂肪组织的分布增加^[16]、血糖、血脂异常等等。肥胖和新生儿在出生后早期即与以后的糖调节受损及代谢异常有关,儿童期肥胖也会增加糖调节受损、高血压、高脂血症的风险。尽管肥胖是糖调节受损、糖尿病发生的重要危险因素,因此选择合适的身体测量指标和适当的切点评估肥胖患者糖、脂代谢异常具有重要意义。以往临床及相关代谢性研究均把腰围、BMI 作为评估中心性肥胖的指标^[9],但因腰围测量的操作方法不规范,冬季测量不方便以及测量过程中受进食的影响等致测量结果变异性较大,导致临床应用的局限性。而 BMI 不能有效区别脂肪组织和肌肉组织,亦不是一种完美的测量指标。颈部脂肪与内脏脂肪组织类似,Tibana RA 等^[12]研究以 CT 扫描腹部脂肪组织评估内脏脂肪含量的研究发现内脏脂肪组织与颈围和腰围均有一定相关性,但颈围与内脏脂肪组织的关系更加密切,说明颈围是评估内脏脂肪组织的良好指标,可以评估超重及肥胖人群的糖、脂代谢异常的程度^[1-4]。但临床上,以 CT、MRI、X 线^[12]作为评估内脏脂肪组织的金标准,因辐射及经济原因仍有一定的不足。Tibana RA 等^[12]研究进一步证实当颈围 ≥ 35 cm 时,对于久坐的女性患者而言,在评估预测心血管危险因素的作用关系上明显优于腰围、BMI 等指标,亦能预测患者收缩压、血糖、HbA1c 及内脏脂肪的含量。

颈围作为一种新的、无创性的检查方法,具有操作方法简便、病人依从性良好,不存在任何危害、不受环境因素影响,结果更加稳定可靠,临床可行性大,有易于推广的优点,是目前评

价糖调节受损的主要指标。Yang GR 和 Joshipura K 等认为颈围较测量腰围及腰部内脏脂肪组织更有意义^[5,17]。目前,Al-fadhli EM 及陈颖超等^[4,16,17]的研究认为颈围与一级亲属的心血管疾病风险有一定相关性,亦与糖尿病视网膜病变^[18]、妊娠期糖尿病^[19]、阻塞性睡眠呼吸暂停综合征^[10,17,20]、脑卒中^[21]有关。在肥胖的阻塞性睡眠呼吸暂停综合征^[20]人群的研究中,随颈围增加,其相关性越大,颈围的灵敏性和特异性方面高于腰围及 BMI 水平,并与血糖调节、胰岛素分泌和 HOMA 指数相关。Vallianou NG 等^[22]在校正入选人群的年龄、性别、学历、运动、吸烟等因素后,发现颈围与高密度脂蛋白-胆固醇、血糖、甘油三酯、尿酸密切相关,且其相关性明显高于 BMI 及正常腰围的人群。Limpawattana P 等^[8]研究认为颈围与空腹血糖、甘油三酯,及收缩压、舒张压、C 反应蛋白、胰岛素、HOMA-IR 密切相关,与 HDL-C 呈负相关。本研究亦证实了上述研究的观点,为糖尿病前期人群及其他代谢综合征人群提供依据。颈围作为代谢综合征及内脏脂肪组织的重要检测指标,对未临床保健及护理等研究拓展了空间。

在实际临床工作中,通过测量社区人群及门诊就诊患者的颈围,对异常人群进行相关实验室检查,对存在糖、脂代谢紊乱的人群给予早期积极有效的生活方式或药物干预治疗,可以防止病情进一步进展,既减轻了病人在躯体、心理上的痛苦及经济上的负担,又减少了国家的公共卫生投入。颈围作为评价糖代谢、脂代谢等紊乱的早期指标^[8,22],以及早发现糖、脂代谢紊乱的高危人群,对临床诊疗工作及社区人群的早期筛查具有重要的意义,为早期糖调节受损人群的临床诊断及治疗提供了理论依据。因此,颈围作为评价糖调节受损及相关代谢性疾病的可靠的指标,临床实用性更强,方法简便,可以被广大医务工作者及患者所接受,其不仅是临床研究中较好的测量指标,而且适用于特殊人群,如卧床人群、妊娠人群等。

参考文献(References)

- [1] Qureshi NK, Hossain T, Hassan MI, et al. Neck Circumference as a Marker of Overweight and Obesity and Cutoff Values for Bangladeshi Adults [J]. Indian journal of endocrinology and metabolism, 2017, 21 (6): 803-808
- [2] Volaco A, Martins CM, Soares JQ, et al. Neck Circumference and its Correlation to Other Anthropometric Parameters and Finnish Diabetes Risk Score (FINDRISC)[J]. Current Diabetes Reviews, 2017, 13: 76
- [3] Yan Q, Sun D, Li X, et al. Neck circumference is a valuable tool for identifying metabolic syndrome and obesity in Chinese elder subjects: a community-based study [J]. Diabetes/metabolism research and reviews, 2014, 30(1): 69-76
- [4] Alfadhli EM, Sandokji AA, Zahid BN, et al. Neck circumference as a marker of obesity and a predictor of cardiometabolic risk among Saudi subjects[J]. Saudi medical journal, 2017, 38(12): 1219-1223
- [5] Yang GR, Yuan SY, Fum, et al. Neck circumference positively related with central obesity overweight, and metabolic syndrome in Chinese subjects with type 2 diabetes: Beijing Community Diabetes Study[J]. Diabetes Care, 2010, 33: 2465-2467
- [6] Fitch KV, Stanley TL, Looby SE, et al. Relationship between neck circumference and cardiometabolic parameters in HIV-infected and non-HIV-infected adults[J]. Diabetes Care, 2011, 34(4): 1026-1031

- [7] Ozkaya I, Yardimci B, Tunckale A, et al. Appropriate neck circumference cut-off points for metabolic syndrome in Turkish patients with type 2 diabetes [J]. *Endocrinologia, diabetesy nutricion*, 2017, 64(10): 517-523
- [8] Limpawattana P, Manjavong M, Sopamong R. Can neck circumference predict metabolic syndrome? An experience from a university community [J]. *Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists*, 2016, 22(1): 8-15
- [9] Wang X, Zhang N, Yu C, et al. Evaluation of neck circumference as a predictor of central obesity and insulin resistance in Chinese adults[J]. *International journal of clinical and experimental medicine*, 2015, 8(10): 19107-19135
- [10] Cizza G, Jonge L, Piaggi P, et al. Neck circumference is a predictor of metabolic syndrome and obstructive sleep apnea in short-sleeping obese men and women[J]. *Metabolic syndrome and related disorders*, 2014, 12(4): 231-241
- [11] Cui T, Yan BH, Liu Z, et al. Neck circumference: A valuable anthropometric measurement to detect metabolic syndrome among different age groups in China [J]. *Diabetes/metabolism research and reviews*, 2018, 34(3)
- [12] Tibana RA, Teixeira TG, Farias DL, et al. Relation of neck circumference and relative muscle strength and cardiovascular risk factors in sedentary women[J]. *Einstein(Sao Paulo)*, 2012, 10(3): 329-334
- [13] Stabe C, Vasques AC, Lima MM, et al. Neck circumference as a simple tool for identifying the metabolic syndrome and insulin resistance: results from the Brazilian Metabolic Syndrome Study[J]. *Clinical endocrinology*, 2013, 78(6): 874-881
- [14] Svley Ah, Hayriye EA, et al. Neck circumference, metabolic syndrome and obstructive sleep apnea syndrome; Evaluation of possible linkage[J]. *Clinical Reseach*, 2013, 19: 111-117
- [15] Joshipura K, Joshipura K, Vergara J, et al. Neck Circumference May Be a Better Alternative to Standard Anthropometric Measures [J]. *Journal of diabetes research*, 2016, 6058916
- [16] Nicklas BJ, Penninx BW, Cesari M, et al. Association of visceral adiposetissue with incident myocardial infarction in older men and women: thehealth, aging and body composition study [J]. *Am J Epidemiol*, 2004, 160: 74
- [17] 陈颖超, 洪洁. 颈围: 一项检测心血管疾病风险因素的新指标[J]. *内科理论与实践*, 2011, 6(6): 448-450
- Chen Ying-chao, Hong Jie. Neck circumference -A new measure of risk factors for cardiovascular disease [J]. *Internal Medicine Theory and Practice*, 2011, 6(6): 448-450
- [18] DiranM, Xie J, Fenwick E, Benarous R, et al. Are obesity and anthropometry risk factors for diabetic retinopathy? [J]. *Invest Ophthalmol Visual Science*, 2011, 52(7): 4416-4421
- [19] Li P, Lin S, Cui J, et al. First Trimester Neck Circumference as a Predictor for the Development of Gestational Diabetes Mellitus [J]. *The American journal of the medical sciences*, 2018, 355(2): 149-152
- [20] Kashine S, Kishida K, Kunahashi T, et al. Selective contribution of waist circumference reduction on the improvement of sleep-disordered breathing in patients hospitalized with type 2 diabetes mellitus[J]. *Internal Medicine*, 2011, 50(18): 1895-903
- [21] Medeiros CA, Bruin VM, Castro-Silva Cd, et al. Neck circumference, a bedside clinical feature related to mortality of acute ischemic stroke [J]. *Revista da Associacao Medica Brasileira*, 2011, (5): 559-564
- [22] Vallianou NG, Evangelopoulos AA, Bountziouka V, et al. Neck circumference is correlated with triglycerides and inversely related with HDL cholesterol beyond BMI and waist circumference [J]. *Diabetes/metabolism research and reviews*, 2013, 29(1): 90-97

(上接第 3971 页)

- [23] Akhavein A, Henriksen C, Syed J, et al. Prediction of single procedure success rate using S.T.O.N.E. nephrolithometry surgical classification system with strict criteria for surgical outcome [J]. *Urology*, 2015, 85(1): 69-73
- [24] Sharma K, Goel A, Gupta S. Re: Okhunov et al. S.T.O.N.E. nephrolithometry: novel surgical classification system for kidney calculi(Urology 2013;81:1154-1160)[J]. *Urology*, 2013, 82(4): 979
- [25] Okhunov Z, Helmy M, Perez-Lansac A, et al. Interobserver reliability and reproducibility of s.T.o.N.e. Nephrolithometry for renal calculi[J]. *J Endourol*, 2013, 27(10): 1303-1306
- [26] Sabnis RB, Ganesamoni R, Doshi A, et al. Micropercutaneous nephrolithotomy (microperc) vs retrograde intrarenal surgery for the management of small renal calculi: a randomized controlled trial[J]. *BJU Int*, 2013, 112(3): 355-361
- [27] 彭国辉,李汉忠,李秉诚,等.SHA.LIN、S.T.O.N.E 评分系统和 Guy's 分级法预测经皮肾镜取石术结石清除率准确性的比较研究 [J]. *中华泌尿外科杂志*, 2016, 37(3): 199-205
- Peng Guo-hui, Li Han-zhong, Li Bing-cheng, et al. Evaluation and comparison of SHA.LIN, S.T.O.N.E nephrolithometry scoring system and Guy's stone score in predicting the accuracy of the percutaneous nephrolithotomy (PCNL) outcomes [J]. *Chinese Journal of Urology*, 2016, 37(3): 199-205
- [28] Mitsui Y, Wada K, Araki M, et al. Ureterolithotripsy for a Ureteral Calculus at the Ureteroureterostomy of a Renal-transplant Recipient [J]. *Acta Med Okayama*, 2017, 71(5): 449-452
- [29] Scarpa RM, Scoffone CM, Cracco CM. Letter about: Treatment for residual stones using flexible ureteroscopy and holmium laser lithotripsy after the management of complex calculi with single-tract percutaneous nephrolithotomy[J]. *Lasers Med Sci*, 2018, 33(2): 451
- [30] 郑浩,侯建全,魏雪栋,等.彩色多普勒超声引导下经皮肾镜取石术 (PCNL) 治疗复杂性肾结石的临床分析 [J]. *现代生物医学进展*, 2014, 14(2): 313-315, 360
- Zheng Hao, Hou Jian-quan, Wei Xue-dong, et al. The Effect of Percutaneous nephrolithotomy in the Treatment of Complicated Renal Calculi under Color Doppler Ultrasound Guidance[J]. *Progress in Modern Biomedicine*, 2014, 14(2): 313-315, 360