Advances in Clinical Medicine 临床医学进展, 2023, 13(7), 11762-11767
Published Online July 2023 in Hans. https://www.hanspub.org/journal/acm
https://doi.org/10.12677/acm.2023.1371648

Hans汉斯

甘油三酯葡萄糖指数在2型糖尿病前期中的研究作用

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收稿日期：2023年6月25日；录用日期：2023年7月19日；发布日期：2023年7月25日

摘 要

2型糖尿病是一种以胰岛素抵抗和血糖持续升高为主要特征的内分泌疾病，随着病情的发展患者可出现不同程度的并发症，如视网膜病变、心血管病变、周围神经病变、糖尿病肾病等。该疾病主要以多尿、多饮、多食、体重减轻为主要临床表现，出现上述症状时通常早已达到2型糖尿病的诊断标准。故疾病的筛查在高危人群中便显得十分重要，胰岛素抵抗通常作为2型糖尿病的主要特征出现在我们的视野，甚至常于2型糖尿病发生前便已存在，患病前明确胰岛素抵抗的存在与否及程度对2型糖尿病的诊断具有重要价值。甘油三酯葡萄糖指数(TyG)是由空腹血浆葡萄糖和甘油三酯两个指标计算而得出的指数，该指数已被明确可作为胰岛素抵抗(IR)的替代生物标志物。本文将以甘油三酯葡萄糖指数与2型糖尿病前期的相关性进行叙述，为病变的早期预防提供一些参考。

关键词

甘油三酯葡萄糖指数，胰岛素抵抗，2型糖尿病前期

The Research Role of Triglyceride Glucose Index in Pre-Type 2 Diabetes

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Received: Jun. 25th, 2023; accepted: Jul. 19th, 2023; published: Jul. 25th, 2023

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文章引用: 徐士博, 赵成玉. 甘油三酯葡萄糖指数在 2 型糖尿病前期中的研究作用[J]. 临床医学进展, 2023, 13(7): 11762-11767. DOI: 10.12677/acm.2023.1371648

Abstract

Type 2 diabetes mellitus is an endocrine disease characterized by insulin resistance and continuous rise of blood sugar. With the development of the disease, patients may develop complications of varying degrees, such as retinopathy, cardiovascular disease, peripheral neuropathy, diabetic nephropathy, etc. The main clinical manifestations of this disease are polyuria, polydipsia and weight loss. When these symptoms appear, the diagnostic criteria of type 2 diabetes are usually already met. Therefore, disease screening is very important in high-risk groups. Insulin resistance usually appears in our field of vision as the main feature of type 2 diabetes, and even exists before the onset of type 2 diabetes. The existence and degree of insulin resistance before the onset of type 2 diabetes is of great value for the diagnosis of type 2 diabetes. Triglyceride glucose index (TyG) is an index calculated by fasting plasma glucose and triglyceride, which has been clearly used as an alternative biomarker for insulin resistance (IR). This article will describe the correlation between triglyceride glucose index and pretype 2 diabetes, so as to provide some references for the early prevention of lesions.

Keywords

Triglyceride Glucose Index, Insulin Resistance, Pre-Type 2 Diabetes

1. 引言

随着我国经济的飞速发展及人民生活质量的明显提高，2 型糖尿病的发病率也在逐年上升[1]，给个人和社会也带来经济负担，因此早期对疾病的筛查，可以及时做出预防。同时人们对疾病认识的提高及对自身健康的关注，使得 2 型糖尿病关注度也进一步升高，但早期 2 型糖尿病患者并未出现较为特异性的症状，通常在体重、血脂、血压方面出现一些异常表现[2] [3]，故在疾病发生前通过一个简易、特异性高的指标对自身进行相关评估便尤为重要。胰岛素抵抗作为 2 型糖尿病的重要因素，及时的对胰岛素抵抗(IR)进行评估便可一定程度的了解 2 型糖尿病的患病程度。胰岛素抵抗评估的方法主要为稳态模型评估(HOMA-IR)、高胰岛素－正葡萄糖钳夹法(HIEC)，而上述两种方法常用于实验室研究，不适于日常临床评估。有研究指出甘油三酯葡萄糖指数(TyG)可作为胰岛素敏感性的替代估计，还有研究指出其与 OGTT 也具有相关性[4]，由于其简单易行的特性可大规模用于临床[5] [6]。该指标可由空腹血糖、甘油三酯计算得出。现就以上述指标及 2 型糖尿病前期为核心展开叙述。

2. TyG

胰岛素抵抗(IR)被定义为胰岛素靶向组织对高生理性胰岛素水平反应出现降低的状态。其发生机制主要包括葡萄糖-脂肪酸循环、己糖胺生物合成途径、异位脂质积累、神经酰胺、内质网应激等，上述机制主要存在于骨骼肌及肝脏中[7]。关于胰岛素抵抗的评估主要为 HOMA-IR、HIEC 两种方法。由于 HIEC 及 HMOA-ir 所存在的限制及考虑因素[8]，故进一步使用新的指标来用于评估是我们需要考虑的一个具有实际价值的方向。TyG 最早于 2008 年的一篇研究中指出可以作为胰岛素抵抗的替代物[9]，该指标是由

甘油三酯(TG)和空腹血糖(FPG)计算而得出，TG、FPG 通过生化实验室检验便可获得其数值，相较于 HOMA-ir、HIEC 的局限性，TyG 拥有简单易行、价格亲民等特点。同时作为胰岛素抵抗金标准的 HIEC 也有研究指出其在胰岛素中的敏感度和 TyG 非常的接近[10]。经过近几年的研究被证实与 2 型糖尿病前期、非酒精性脂肪肝、肾病、心血管疾病等均有相关性[11]-[16]。接下来将分别介绍 TyG 与上述疾病之间的相关性。

2.1. TyG 与 2 型糖尿病前期

TyG 已被证实与 2 型糖尿病的发病率存在明显的相关性[17]，2 型糖尿病前期尚未存在官方的诊断标准，主要通过糖化血红蛋白、OGTT、静脉血浆葡萄糖水平进行相关评估，而 TyG 除了与胰岛素抵抗明显相关外，与上述标准均有相关性[18]。故该指标对 2 型糖尿病前期的筛查至关重要。该指标由空腹血糖与甘油三酯计算得出，空腹血糖与 2 型糖尿病的关系已不需赘述。有研究指出高甘油三酯是 2 型糖尿病及糖尿病前期风险密切相关的危险因素[19] [20]，甘油三酯和 TG/HDL-C 有希望成为糖耐量异常的标志物[21]。同时 TyG、VAI 和 TG 结合到一起可显著增强他们中单一指标对糖尿病前期的诊断价值[22]。

2.2. TyG 与非酒精性脂肪肝

非酒精性脂肪肝是最为常见的肝脏疾病之一[23]，导致该疾病的因素以肥胖、不健康饮食、血脂异常、2 型糖尿病为主[24]，随着疾病的发展最后可进展为肝硬化、肝衰竭。IR 作为 2 型糖尿病的重要相关因素也可作为非酒精性脂肪肝的独立预测因子[25]，而 TyG 作为 IR 的替代物也可达到相应的作用。除此之外，有研究指出 TyG 可以有效的识别存在非酒精脂肪肝风险的个体[26] [27] [28] [29]。

2.3. TyG 与肾病

由于 2 型糖尿病是慢性肾病及终末期肾病的主要原因之一[30]，故作为 2 型糖尿病前期评估指标的 TyG 也可考虑其是否与肾病的发生存在一些联系。一项回顾性研究指出 TyG 指数与血清 β2-MG 及 CysC 水平均有相关性，所以 TyG 指数水平升高与高血压患者早期肾功能损害的发生存在密切的相关性，该研究指还出在预测早期肾功能损害时相关性未达到预期[31]。终末期肾病的发生风险与 TyG 的关系现阶段也有研究指出存在正相关[15] [32]。

2.4. TyG 与心血管疾病

心血管疾病的危险因素主要包括年龄、男性、肥胖、高血压、糖尿病、高胆固醇。而有研究指出在没有上述因素的情况下也可发生心血管疾病[33]，故早期有效的识别心血管疾病的风险对预防及后续治疗十分有积极意义。IR 与心血管疾病的关联性已被证实[34]。一项横断面研究指出 TyG 与高血压的发生存在明显的正相关[35]。而 TyG 作为 IR 的替代标志物也已被证实其与动脉粥样硬化的发生风险及严重程度均密切相关[36] [37]。在心血管疾病中急性冠状动脉综合征的存在增加了患病人群的死亡率，其主要包括不稳定性心绞痛、非 ST 段抬高型心肌梗死、ST 端抬高型心肌梗死。现今冠状动脉综合征与 TyG 相关性研究较少，但现有研究指出 TyG 可最为糖尿病合并冠状动脉综合征风险分级及预后的指标[38]，也可单独用于预测冠多血管冠状动脉疾病严重程度、预后的独立指标。

3. 2 型糖尿病前期

2 型糖尿病前期是一种糖尿病的高风险状态，其介于健康人群与糖尿病患者之间。该阶段的评估仍通过空腹血糖及胰岛素抵抗来进行。这种状态下的人群并不会一定发展为 2 型糖尿病，但由于 2 型糖尿病的普遍性以及现今已有研究证明该阶段的高血糖状态与心血管疾病、视网膜病变均有高度的相关性[39]

[40]，所以我们仍然需要早期对高危人群进行相关的预测和评估。有研究指出该阶段的治疗主要以生活方式干预为主，通过改变日常饮食习惯及体育锻炼可以降低发展为 2 型糖尿病的风险[41]。

4. 总结

2 型糖尿病作为常见的内分泌疾病，其并发症如视网膜病变、周围神经病变、肾脏病变、微小血管病变等对我们人体造成了极大的伤害，所以在疾病的早期仍需要我们时刻的关注，以避免疾病的发生。TyG 作为预测指标相较于常规生化指标如糖化血红蛋白、C 肽、OGTT 等仍存在一定的局限性，但由于其简便性，在前期的筛查中可有一席之地。同时作为医务人员也需要对 2 型糖尿病的早期增加关注度。

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