http://www.cjmb.org doi 10.34172/cjmb.2023.4007

Open Access Editorial

Crescent Journal of Medical and Biological Sciences
Vol. 10, No. 4, October 2023, 151–152
eISSN 2148-9696

Diagnosing Polycystic Ovary Syndrome Using Triglyceride-Related Indices: Is It Possible Without Rotterdam Criteria?

Betül Keyif[1*], Ali Yavuzcan[2], Mertihan Kurdoğlu[3]

Polycystic ovary syndrome (PCOS) is a common complicated hormonal condition of the women in reproductive age with a prevalence of 5–15% (1). Its characteristic features include polycystic ovary morphology under sonography, ovulatory dysfunction, and hyperandrogenism (2). Irrespective of reproductive disorders, it was reported that PCOS is implicated with the disorders of metabolism such as type 2 diabetes (T2DM), cardiovascular diseases, and impaired glucose tolerance (3). In PCOS, the tendency for fat accumulation in intraabdominal stores of fat is frequently observed, and it is linked to an increased risk of cardiovascular disorders and T2DM (4). A woman with PCOS usually visit the physician for reasons such as obesity, hair loss, hypertension, impaired glucose tolerance, and hyperlipidemia. On the other hand, the exact diagnosis of PCOS is made by a gynecologist according to the Rotterdam consensus criteria (5) at the end. Its early detection using simple markers by other medical disciplines rather than the gynecologists will reduce the burden attributable to metabolic risks.

It was reported that the conventional ratios of lipid such as low-density lipoprotein cholesterol (LDL-C)/ high-density lipoprotein cholesterol (HDL-C), total cholesterol (TC) / HDL-C, triglycerides (TG)/HDL-C, and fasting TG are elevated in PCOS patients (6). In insulin-resistant (IR) states, delayed TG-rich lipoprotein clearance from blood plasma results in hypertriglyceridemia (7).

The triglyceride glucose (TyG) index is obtained by the formula: napierian logarithmic (ln) [fasting TG (mg/dL) × fasting blood glucose (FBG) (mg/dL)/2] and it was firstly reported as an index to identify IR (8). TyG index predicts glycolipid-metabolism-related diseases efficiently (8). Triglyceride glucose-body mass index (TyG-BMI) has been recently reported to be a helpful marker in early detection of T2DM risk, which is a common phenomenon in PCOS (9, 10). TyG-BMI, calculated as [TyG × BMI], was also shown as a non-invasive, simple, and cost-effective tool for separating the patients with non-alcoholic fatty liver disease from the ones without this disease, accurately (11). Lipid accumulation product (LAP) index was described as an indicator to identify adults with cardiovascular risk (12). It is a simple index for over accumulation of lipid and its formula is [(waist circumference -WC- in cm – 58) x fasting TG concentration (mmol/L)] (12).

Zheng et al reported in 2022 that TyG-BMI and TyG index were used to predict IR in Chinese PCOS patients (7). They also showed that TyG-BMI and TyG index were significantly higher in PCOS patients but they could not found an appropriate cut-off value (7). Kheirollahi et al. recently claimed that in Iranian PCOS women, TyG strongly predicted HOMA-IR with area under the curve (AUC) of 0.623 ($P<0.05$) (1) but they did not use TG related markers in the diagnosis of PCOS. Wehr et al. claimed that in age-adjusted analyses, LAP levels of Austrian PCOS women were higher than those of controls and added that the best cutoff value for LAP for defining impaired glucose tolerance was revealed by ROC curve analyses (13). The results with LAP is very encouraging for its possible role in early detection of cardiometabolic risk together with IR and it may help to assess hyperandrogenism in lean Turkish PCOS women (14). However, there was not any data about early diagnosing PCOS using TG-related indices like TyG, TyG-BMI and LAP.

As a result, the exact diagnosis can be delayed in some of women with PCOS, but TG related markers cannot be used as early objective diagnostic markers for PCOS for time being.

Betül Keyif graduated from Faculty of Medicine, Uludağ University, Bursa, Turkey. She completed her residency in the field of obstetrics and gynecology at İstanbul Faculty of Medicine, İstanbul University, İstanbul, Turkey in 2016. She worked as an obstetrician and gynecologist, in Hakkari Yüksekova State Hospital for 2 years. Later, she worked in Bolu İzzet Baysal Maternity & Pediatrics Hospital and Bursa Kestel State Hospital in 2019. Currently, she has been working as an Assistant Professor in the Department of Obstetrics and Gynecology at Düzce University Faculty of Medicine since 2021. Her areas of interest are gynecological oncology, minimal invasive surgery, and polycystic ovary syndrome (PCOS).

Received 10 July 2023, **Accepted** 1 September 2023, **Available online** 6 September 2023

[1]Düzce University Faculty of Medicine, Department of Obstetrics and Gynecology, Düzce, Turkey. [2]University of Health Sciences Faculty of Medicine, Department of Obstetrics and Gynecology, Ankara Bilkent City Hospital, Turkey. [3]Kırıkkale University Faculty of Medicine, Department of Obstetrics and Gynecology, Kırıkkale, Turkey.
***Corresponding Author:** Betül Keyif, +90 380 542 13 90; Email: betul_keyif@hotmail.com

Authors' Contribution

Conceptualization: Betül Keyif and Ali Yavuzcan.
Project administration: Ali Yavuzcan.
Supervision: Mertihan Kurdoğlu.
Writing–original draft: Betül Keyif and Ali Yavuzcan.
Writing–review & editing: Mertihan Kurdoğlu.

Conflict of Interests

None.

Ethical Issues

Not applicable.

References

1. Kheirollahi A, Teimouri M, Karimi M, et al. Evaluation of lipid ratios and triglyceride-glucose index as risk markers of insulin resistance in Iranian polycystic ovary syndrome women. Lipids Health Dis. 2020;19:235. doi:10.1186/s12944-020-01410-8
2. March WA, Moore VM, Willson KJ, Phillips DIW, Norman RJ, Davies MJ. The prevalence of polycystic ovary syndrome in a community sample assessed under contrasting diagnostic criteria. Hum Reprod. 2009;25(2):544-551. doi:10.1093/humrep/dep399
3. Paschou SA, Polyzos SA, Anagnostis P, et al. Nonalcoholic fatty liver disease in women with polycystic ovary syndrome. Endocrine. 2019;67(1):1-8. doi:10.1007/s12020-019-02085-7
4. Williams CM. Lipid metabolism in women. Proceedings of the Nutrition Society. 2007;63(1):153-160. doi:10.1079/pns2003314
5. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertil Steril. 2004;81(1):19-25. doi:10.1016/j.fertnstert.2003.10.004
6. Ghaffarzad A, Amani R, Mehrzad Sadaghiani M, Darabi M, Cheraghian B. Correlation of serum lipoprotein ratios with insulin resistance in infertile women with polycystic ovarian syndrome: A case control study. Int J Fertil Steril. 2016;10(1):29-35. doi:10.22074/ijfs.2016.4765
7. Zheng Y, Yin G, Chen F, Lin L, Chen Y. Evaluation of triglyceride glucose index and homeostasis model of insulin resistance in patients with polycystic ovary syndrome. Int J Womens Health. 2022;14:1821-1829. doi:10.2147/ijwh.s387942
8. Simental-Mendía LE, Rodríguez-Morán M, Guerrero-Romero F. The product of fasting glucose and triglycerides as surrogate for Identifying insulin resistance in apparently healthy subjects. Metab Syndr Relat Disord. 2008;6(4):299-304. doi:10.1089/met.2008.0034
9. Yang Q, Xu H, Zhang H, et al. Serum triglyceride glucose index is a valuable predictor for visceral obesity in patients with type 2 diabetes: a cross-sectional study. Cardiovasc Diabetol. 2023;22(1). doi:10.1186/s12933-023-01834-3
10. Zheng S, Shi S, Ren X, et al. Triglyceride glucose-waist circumference, a novel and effective predictor of diabetes in first-degree relatives of type 2 diabetes patients: cross-sectional and prospective cohort study. J Transl Med. 2016;14(1):260. doi:10.1186/s12967-016-1020-8
11. Hu H, Han Y, Cao C, He Y. The triglyceride glucose-body mass index: a non-invasive index that identifies non-alcoholic fatty liver disease in the general Japanese population.J Transl Med. 2022;20(1):398. doi:10.1186/s12967-022-03611-4
12. Kahn HS. The "lipid accumulation product" performs better than the body mass index for recognizing cardiovascular risk: a population-based comparison. BMC Cardiovasc Disord. 2005;5:26. doi:10.1186/1471-2261-5-26
13. Wehr E, Gruber H-J, Giuliani A, Möller R, Pieber TR, Obermayer-Pietsch B. The lipid accumulation product Is associated with impaired glucose tolerance in PCOS women. J Clin Endocrinol Metab. 2011;96(6):E986-E990. doi:10.1210/jc.2011-0031
14. Anik Ilhan G, Yildizhan B, Pekin T. The impact of lipid accumulation product (LAP) and visceral adiposity index (VAI) on clinical, hormonal and metabolic parameters in lean women with polycystic ovary syndrome. Gynecol Endocrinol. 2018;35(3):233-236. doi:10.1080/09513590.2018.1519794