

Letter to Editor

Bazett's Formula: Is it Rational to be Used?

Asghar Mohamadi¹

¹ Lorestan University of Medical Sciences, Khorramabad, Iran

Received: 04.12.2017; Accepted: 24.01.2018

Dear Editor

In an experimental study which was conducted by Moghaddasi et al. titled "The effects of Olive Leaf Extract Administration on Cerebral Hypoperfusion-Induced Electrophysiological Alterations in Rat Heart", the authors have assessed the changes in electrocardiographic parameters as an interesting idea that can increase our knowledge in the field of neurocardiology. The authors have used Bazett's formula in the methodology of this study to calculate QTC. We have explained the use of this formula and its accompanying challenges in the interpretation of QT interval.

The QT interval refers to the interval between the onset of depolarization and the end of ventricular repolarization (1). Prolonged QT can lead to variants of fatal ventricular arrhythmia such as Torsades de pointes and sudden cardiac death (2). Since the QT interval shows variations with heart rate, QTC must be calculated before QT interval can be interpreted correctly at different heart rates (3). Five formulae have been suggested so far for calculating QTC (4-8):

1. Bazett: $QTcB = QT/RR^{1/2}$
2. Frederica: $QTcFri = QT/RR^{1/3}$
3. Framingham: $QTcFra = QT + 0.154(1 - RR)$
4. Rautaharju: $QTcR = QT - 0.185(RR - 1) + k$ ($k = +0.006$ s for men and 0 for women)
5. Hodges: $QTcH = QT + 0.00175(HR - 60)$

Numerous studies have been carried out to show the advantages of each of these formulae, all of which

have emphasized the inferiority of Bazett's formula (9, 10). Indeed, this formula is affected by heart rate, so that in 30% of the cases with normal electrocardiograms (11), it diagnosed a prolonged QT and overestimated (underestimated) the QT interval at high (low) heart rates (3). In *Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine*, the authors emphasized ineffectiveness of Bazett's formula, hence suggested the use of Hodges' formula in clinical practices (11). In general, the contribution of heart rate into Hodges' formula is significantly smaller than those into other formulae (12).

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Garson A. How to measure the QT interval—what is normal? *The American journal of cardiology*. 1993;72(6):B14-B6.
2. Van Noord C, Eijgelsheim M, Stricker BHC. Drug- and non-drug-associated QT interval prolongation. *British journal of clinical pharmacology*. 2010;70(1):16-23.
3. Vandenberg B, Vandel E, Robyns T, Vandenberghe J, Garweg C, Foulon V, et al. Which QT correction formulae to use for QT monitoring? *Journal of the American Heart Association*. 2016;5(6):e003264.
4. Bazett H. AN ANALYSIS OF THE TIME-RELATIONS OF ELECTROCARDIOGRAMS. *Annals of Noninvasive Electrocardiology*. 1997;2(2):177-94.
5. Fridericia LS. Die Systolendauer im Elektrokardiogramm bei normalen Menschen und bei Herzkranken. *Journal of Internal Medicine*. 1920;53(1):469-86.
6. Sagie A, Larson MG, Goldberg RJ, Bengtson JR, Levy D. An improved method for adjusting the QT interval for heart rate (the Framingham Heart Study). *The American journal of cardiology*. 1992;70(7):797-801.
7. Hodges M. Bazett's QT correction reviewed: evidence that a linear QT correction for heart rate is better. *J Am Coll Cardiol*.

1983;1:694.

8. Rautaharju PM, Zhang Z-M, Prineas R, Heiss G. Assessment of prolonged QT and JT intervals in ventricular conduction defects. *The American journal of cardiology*. 2004;93(8):1017-21.
9. Malik M. Problems of heart rate correction in assessment of drug-induced QT interval prolongation. *Journal of cardiovascular electrophysiology*. 2001;12(4):411-20.
10. Strohmer B, Schernthaner C, Iglseder B, Paulweber B, Pichler M. Gender-specific effect of metabolic syndrome on rate adjusted QT interval in middle-aged participants of an atherosclerosis prevention program. *Wiener klinische Wochenschrift*. 2007;119(17):544-52.
11. Bonow R, Mann D, Zipes D, Libby P. Braunwald's heart disease. A text book of cardiovascular medicine. Tenth edition ed: Elsevier Saunders; 2015.
12. Luo S, Michler K, Johnston P, Macfarlane PW. A comparison of commonly used QT correction formulae: the effect of heart rate on the QTc of normal ECGs. *Journal of electrocardiology*. 2004;37:81-90.

***Corresponding Author:** Asghar Mohamadi, MSc, Lorestan University of Medical Sciences, Khorramabad, Iran; Email: asgharheart@gmail.com.