1,4-Benzodioxin Derivatives as Dual Inhibitors for Alpha-amylase and Alpha-glucosidase for Managing Type 2 Diabetes

Al Abdulbaqi, Maryam (School: Safwa First Secondary School)

Type 2 diabetes impacts the patient's quality of life, society and the health system. It is estimated that by 2030, the numbers of people diagnosed are expected to exceed 552 million. Inhibition of Alpha-amylase and Alpha -glucosidase, which digest dietary complex carbohydrates into glucose, has been the focus to control glucose levels in the blood. Inhibitors used nowadays have many long-term side effects. For that reason, the aim of this study is to develop new inhibitors for both enzymes and test their inhibitory potential. 1,4-benzodioxin bases Schiff bases compounds (1-25) were synthesized using magnetic stirrer. The inhibitors were characterized by various spectroscopic methods: 1HNMR, 13CNMR, HRMS and IR. In addition, the compounds were evaluated for Alpha-amylase and Aplha-glucosidase inhibitory potential and repeated three times using ELISA technique. To assess the interaction of active compounds with enzymes, a molecular docking study was carried out. 25 novel inhibitors were developed. The Alpha-amylase activity of these compounds ranged between 0.70 ± 0.01 to 30.80 ± 0.80 µM, compared with standard acarbose of 12.80 ± 0.10 µM. On the other hand, Alpha-glucosidase inhibition activity ranging from IC50 = 0.70 ± 0.01 µM to IC50 = 19.80 ± 0.40 µM compared with IC50 = 12.90 ± 0.10 µM for standard acarbose. The docking results revealed that all of the compounds had different binding modes. To conclude, this study has identified a new class of potent α-amylase and Alpha-glucosidase inhibitors for further investigation.

Awards Won:

Fourth Award of $500