

Detection of Arterial Stiffness in Diabetes Using Photoplethysmograph

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Abstract : Diabetes is a metabolic disorder and with the increase of global prevalence of diabetes, cardiovascular diseases and mortality related to diabetes has also increased. Diabetes causes the increase of arterial stiffness by elusive hormonal and metabolic abnormalities. We used photoplethysmograph (PPG), a simple non-invasive method to study the change in arterial stiffness due to diabetes. Toe PPG signals were taken from 29 diabetic subjects with mean age of (65 ± 8.4) years and 21 non-diabetic subjects of mean age of (49 ± 14) years. Mean duration of diabetes is 12 ± 8 years for diabetic group. Rise-time (RT) and area under rise time (AUR) were calculated from the PPG signal of each subject and Welch's t-test is used to find the significant difference between two groups. We obtained a significant difference of (p-value) 0.0005 and 0.03 for RT and AUR respectively between diabetic and non-diabetic subjects. Average value of RT and AUR is 0.298 ± 0.003 msec and 14.4 ± 4.2 arbitrary units respectively for diabetic subject compared to 0.277 ± 0.0005 msec and 13.66 ± 2.3 a.u respectively for non-diabetic subjects. In conclusion, this study support that arterial stiffness is increased in diabetes and can be detected early using PPG.

Keywords : area under rise-time, AUR, arterial stiffness, diabetes, photoplethysmograph, PPG, rise-time (RT)

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