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| **Abstract Title** | Macular function and structure in early diabetic retinopathy |
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| **Introduction** | Single centre, prospective cross-sectional controlled observational study |
| **Purpose** | The effect of diabetes on retinal biology in early disease is poorly understood. We investigated functional and structural alterations in the macula in people with diabetes (PWD) with early diabetic retinopathy. |
| **Methods** | PWD referred from the Liverpool Diabetic Eye Screening Programme (LDESP) to hospital clinics as being at risk of diabetic macular oedema (DMO) and age-matched healthy controls (HC) were recruited. Macular function was measured using handheld radial shape discrimination (hRSD), distance and near visual acuity (VA). Macular structure was measured using optical coherence tomography (OCT; Spectralis, Heidelberg Eye Explorer 1.10.0.0, version 6.8a). Retinal layer segmentation was performed using Heidelberg autosegmentation software with manual adjustment as needed. Full and individual retinal layer thickness across all Early Treatment Diabetic Retinopathy Study (ETDRS) subfields were measured. One eye from each participant was randomly selected for analysis. |
| **Results** | 292 PWD (mean±SD age 54±14yrs, 175 males) cases and 50 HC (55±14yrs, 26 males) were recruited. Compared to HC, hRSD performance and distance VA were progressively worse in PWD with no or minimal diabetic retinopathy (DR), (hRSD logMAR: HC -0.77±0.11, no DR -0.68±0.18, minimal DR -0.61±0.25, ANOVA p<0.001; distance VA logMAR: HC -0.08±0.12, no DR 0.03±0.15, minimal DR 0.06±0.16, ANOVA p<0.001). There was also a reduction in full retinal thickness across most subfields. Compared to HC, retinal nerve fibre layer thickness was reduced in outer subfields (OS) in PWD with no DR (4.6µm, 12.3% difference, p<0.001) or minimal DR (2.7µm, 7.2%, p=0.015). Compared to HC, ganglion cell layer thickness was reduced in the in inner subfields (IS) in PWD with no DR (4.1µm, 8%, p=0.003) and in both IS and OS in PWD with minimal DR (5.1µm, 9.9%, p<0.001; 1.9µm, 5.5%, p=0.015, respectively). |
| **Conclusions** | Functional and structural changes are detectable in the early pathogenesis of DR, consistent with inner neuroretinal thinning developing before microvascular abnormalities. Our findings add further support to the concept of “pre-clinical retinopathy”. Future studies to explore OCT thickness measurements as surrogate markers for DR neurodegeneration will be useful. |
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