The Role of Body Mass Index and Blood Pressure in Paediatric Diabetic Retinopathy: A Study of Risk and Progression

Vincent Ng[1,2], Risantini Murugan[1], Sunil Mamtora[3], Prasadi De Silva[1], Sophia Martin[1], Sohail Akbar[1], Chanelle Smith[4], Swati Karandikar[1], Justina Rweyemamu[1]

1. University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK 2. Birmingham AI & Digital Health Research & Policy Group, Birmingham, UK 3. Bristol Eye Hospital, Bristol, UK 4. New Cross Hospital Eye Infirmary, Wolverhampton, UK

Corresponding author: Vincent Ng; email: Vincent.ng4@nhs.net; There are no conflicting interests with any of the authors.

INTRODUCTION

Diabetic Retinopathy (DR) is the most common microvascular complication of diabetes mellitus (DM), leading to visual impairment and blindness. In the UK, annual screening for retinopathy is recommended for patients with type 1 diabetes (T1DM) from age 12. The National Paediatric Diabetes Audit of England and Wales (NPDA) 2021/2022 reported 11.4% of children and young people aged 12-24 years to have an abnormal retinopathy screening result. Mean HbA1c outcomes improved from 2020/2021 to 2021/2022 despite the challenges of Covid-19.

It is crucial to investigate the various risk factors associated with diabetes and their association with diabetic retinopathy, as this could help alleviate the progression of this condition. Recent studies have demonstrated an association between patient weight in the adult population and diabetic retinopathy progression, with increasing abdominal obesity associated with worsening diabetic retinopathy. Hypertension has also been shown to worsen the prognosis of diabetic retinopathy in adult population. However, there is still limited research in studying the association of weight, hypertension and diabetic retinopathy in the paediatric diabetic population.

OBJECTIVES

The objective of this study is to examine the relationship between blood pressure and body mass index (BMI) and their impact on diabetic retinopathy progression within paediatric T1DM patients.

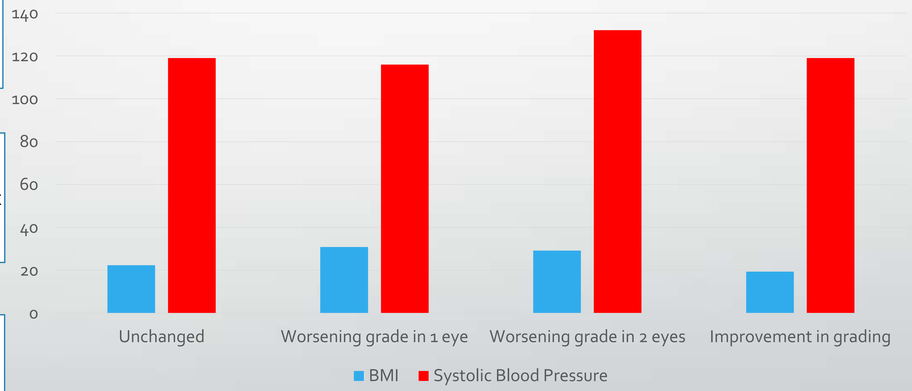
METHODS

- **Study design:** Retrospective cohort study
- **Study period:** April 2015 – March 2024
- **Participants:** Patients between the age of 12 to 17 with a diagnosis of T1DM and enrolled in the national diabetic retinopathy screening in the University Hospitals Birmingham Paediatric Service
- **Data collection:** Relevant clinical data, including demographic factors, duration from diagnosis to screening, diabetic retinopathy/maculopathy screening results, HbA1c, blood pressure, body mass index were collected
- **Main outcome measures**: Progression of diabetic retinopathy grades in paediatric patients with T1DM

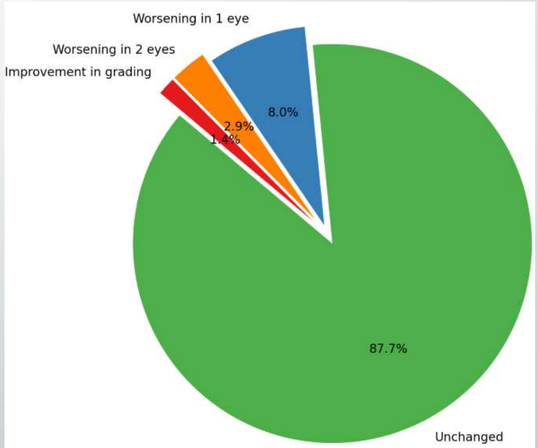
RESULTS

- Number of cases: 138 paediatric T1DM patients (52.9% male, 47.1% female). mean age 16.1 ± 2.17 years.
- Generalised linear model revealed BMI to be a significant (p=0.00471) predictor of diabetic retinopathy grade progression, with a higher BMI being associated with the increased odds of worsening of the grade
- Mean HbA1c: 63 mmol/mol (normal retinopathy result); 73 mmol/mol (abnormal retinopathy result)
- Mean time between diagnosis and initial diabetic screening: 52.1 weeks

Mean BMI and systolic blood pressure for patients categorised due to changes between initial and most recent diabetic retinopathy screening



Proportion of patients categorised due to changes between initial and most recent diabetic retinopathy screening



DISCUSSION

Assessing the impact of blood pressure and BMI revealed that BMI is a more significant predictor of diabetic retinopathy progression. Since BMI is a modifiable risk factor, it is crucial to develop strategies to maintain an appropriate BMI in this patient group. Future research should explore the impact of various factors, such as diet, physical activity, and lifestyle choices, on changes in diabetic retinopathy progression through alterations in BMI. Overall, a higher BMI of around 29–31 in paediatric T1DM patients is associated with increased odds of worsening diabetic retinopathy grades