On the survival of diabetic mellitus II individuals in the United Kingdom (UK): a retrospective case-control study

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1. Introduction

Above 6% of the UK population is living with Diabetes Mellitus (DM) an increase of 1.6 percent points from 4.6% reported in 2014 of whom 90% have Diabetes Mellitus II (T2DM) patients [1]. The prevalence of DM is high in men (9.6%) compared to women (7.6%) [2]. The increase in the prevalence rate has costed the United Kingdom (UK) about £10 billion in medical costs per year, with £8.8 billion due to T2DM.

It was estimated that individuals with T2DM, in the UK, are 50% more likely to die prematurely. ONS has reported that though there has been improvements in general mortality rates from 2000 to 2010, there has been a decline in the increase of life expectancy such that it has been near constant since 2011. ONS also reported that deaths caused by DM increased by 31.24% between 2013 and 2019. This was a significant increase in 6 years. Several studies have estimated mortality risk among T2DM to be twice higher than non-diabetics. [3, 4]

2. Methodology

2.1 Data Source

The study made use of the The Health Improvement Network (THIN) database which currently stores 15.6 million UK patients with more than 3 million patients registered with active general practices. These active patients represent about 6% of the UK population [5]. THIN is generalisable to the UK population [6].

2.2 Selection Criteria

Individuals aged 50 to 74 years at diagnosed of T2DM between 2000 and 2016, inclusive, and with no prior diagnosis in cancer, CKD 3-5, dementia, cognitive impairment and stroke or with less severe heart attack, heart failure or PVD were selected for the study. In addition, only those with diagnosis date greater than the practice's AMR date and were registered with the practice for at least 12 months before diagnosis qualified for the study. These individuals were matched by age, gender and practice to at most 3 controls who had no exclusion conditions stated above.

2.3 Model Variables

The study adjusted for year of entry (diagnosis year for T2DM individuals), age group, DM indicator, gender, smoking status, TDI,AF, HF, HCL, HTN, MI, PVD and BMI group.

2.4 Outcome of interest:

All-cause mortality.

2.5 Statistical Analysis

Mortality hazards were estimated using the time-varying Gompterz-Cox model with general practice as frailty effect from Gamma(θ,θ) distrubution.

3. Results

A total of 221 186 (57.6% Males, 30.8% T2DM) individuals were selected. The total number of deaths during the follow-up period was 29 694 constituting 13.4% of the total study sample. The 50-59 years old individuals constituted 41.34% of the total study sample. The average age was 61 years across all years of entry.Both T2DM and diabetic-free individuals had more than 45% non-smoker prevalance. The prevalence of AF, HF, MI and PVD were less than 15% in all years of entry for both the T2DM and diabetic-free.

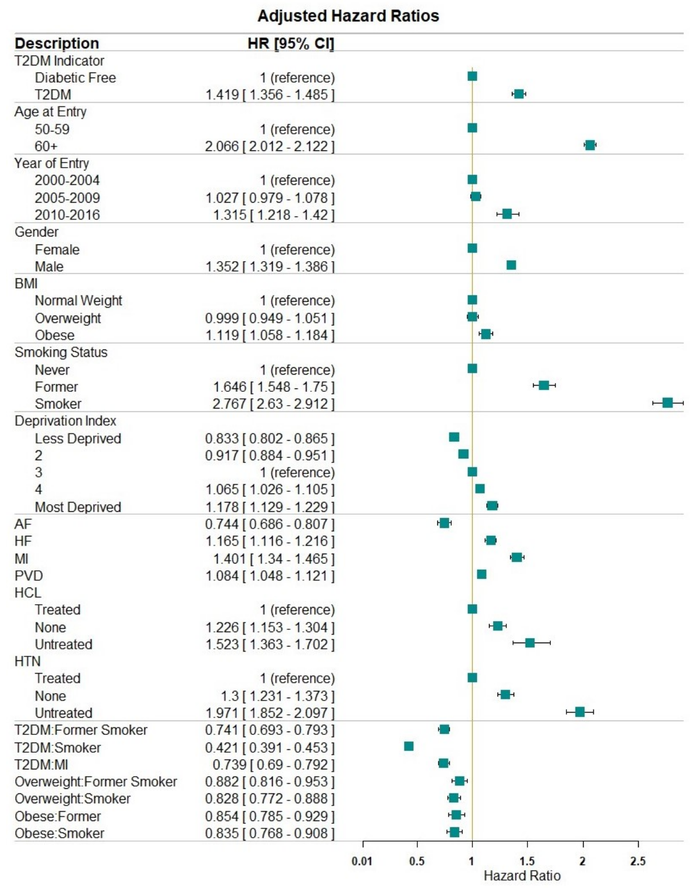

Figure 1: *All-cause mortality hazard ratios.*

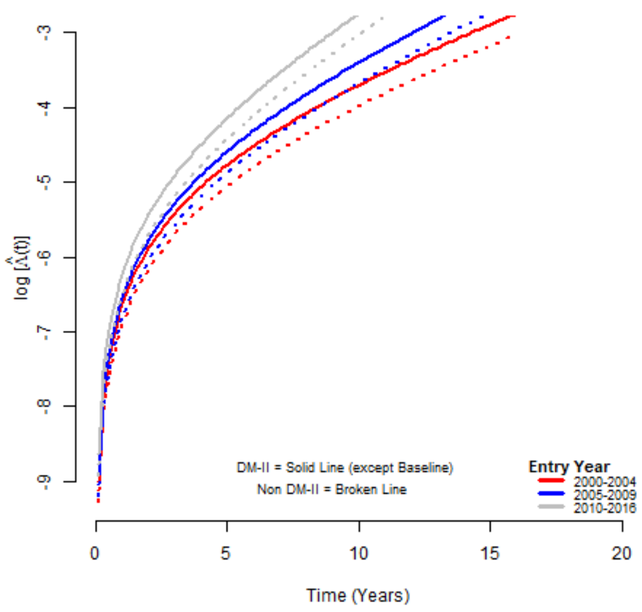

Figure 2: *Cumulative hazards for both T2DM and non-diabetic females, aged 50 to 59 years by year of diagnosis.*

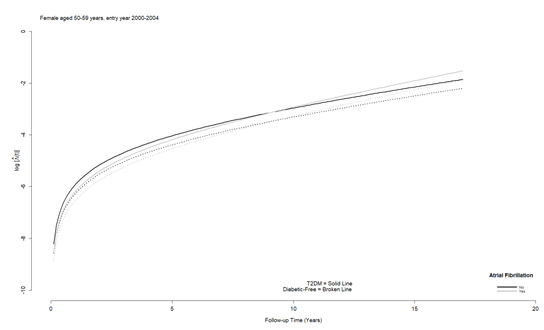

Figure 3: *Cumulative hazards for both T2DM and non-diabetic females, aged 50 to 59 years by AF diagnosis.*

4. Analysis

T2DM continues to increase the risk of mortality by 41.9% compared to non-diabetics. Age on its own still remains an independent mortality risk factor. Smoking was estimated to increase the risk of mortality by 17.67% compared to nonsmokers. The 2010-2016 cohort had higher mortality hazard in both T2DM and non-diabetic when compared to the 2000-2004 cohort in 5 years of follow-up. The three cohorts had similar distribution of individuals by age and gender. It would have been expected to see improvements in mortality by year due to medical advancement and guidelines. Less severe Atrial Fibrillation (AF) increased risk of mortality after 10 years of follow-up, Figure 3.

5. Conclusion

All-cause mortality hazard is on the increase in both individuals with or without T2DM among individuals aged 50 years and above. Hence, focusing on medical advancement and guidelines without intensifying improvements on other life limiting risk factors may not necessarily improve all-cause mortality hazard.

References

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