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Investigation of Fasting Plasma Glucose in Masters Athletes

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Abstract

Prior research documented differences in fasting plasma glucose (FPG) between older and younger masters athletes at the Golden Oldies Rugby Festival (GORF). It was the purpose of our study to further investigate FPG on a larger sample. FPG data was collected on 486 participants at the Sydney World Masters Games. Of the males, 241 reported optimal FPG and 36 reported sub-optimal FPG. For females 183 reported optimal FPG and 26 reported sub-optimal FPG. Analysis was conducted utilising the age ranges implemented in past research on the GORF. The mean FPG for masters athletes below 50 years old was 5.10±1.52 mmol/L, whilst for those 50 years and above it was 5.01±1.02. The difference between the groups was not significant (t = 0.722, p = 0.471). This aligned with the finding of the GORF study that there was no significant difference in FPG between the different age ranges analysed. The sample size obtained for this investigation of FPG in masters athletes was more than double the number of participants used in previous research on the GORF. Many participants had FPG above optimal levels. Therefore, an age-related decline in pancreatic function may outweigh protective exercise benefits attained from masters sport participation.

Keywords: World Masters Games, Golden Oldies Rugby Festival, Masters Athletes, Fasting Plasma Glucose.

INTRODUCTION

Fasting Plasma Glucose

The Fasting Plasma Glucose (FPG) test is used to screen for diabetes. High FPG levels and diabetes are associated with a higher incidence of cardiovascular disease and all-cause mortality [1]. The World Health Organisation defines an optimal FPG test result as a score below 5.5 mmol/L [2].

The Golden Oldies Rugby Festival

The Golden Oldies Rugby Festival (GORF) is an International rugby competition held biennially and open to all rugby players aged 35 and over. Prior published research collected demographics of physiological and pathology variables for competitors of at the GORF [3]. Analysis in this published study on the GORF examined FPG differences between competitors aged below fifty years old and those fifty years old and above (<50yrs, n= 96 and ≥50yrs, n=120) [3]. The FPG scores (mmol/L) were such that 75.0% of the under 50s had FPG in optimal ranges with mean ± standard deviation of 5.5 ± 3.4, whilst for those with age 50 and above 50.0% had FPG in optimal ranges, with mean ± standard deviation of 5.8 ± 2.6 [3]. An independent samples t-test ($p < 0.05$) was conducted between these groups to see if there was a significant difference between groups, but no significant difference was identified [3]. It was therefore the purpose of this study to further investigate FPG differences between older and younger athletes by analyzing medical and physiological demographics on an alternative larger sample from a similar athletic cohort. As well as physiological and pathological demographics, published research on the GORF includes motivations [4-6], medical consequences [7] and training type and frequency [5].

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This manuscript focuses on differences in FPG between older and younger masters athletes. Masters athletes are defined as those systematically training for and competing in organized sporting events designed specifically for older adults [8]. Masters athletes have led a physically active lifestyle for an extended period of time or initiated exercise/sport in later life [9]. Competing in sport at older ages has been shown to be beneficial for a number of health indices including general cardiovascular health [10], blood pressure [11], improved lipids [12], reduced frailty/sarcopenia [13] and muscular strength and function [14]. GORF participants are categorized as masters athletes. The biggest masters sporting event (by participant number) is the World Masters Games (WMG). It is also the world's largest lifelong sports competition with over 170,000 sports enthusiasts participating so far [15]. Participation at the WMG is open to sports people of all abilities, limited by age. The minimum age criterion ranges between 25 and 35 years depending upon the sport. The data used in this manuscript was data gathered at the Sydney WMG, which attracted 28,089 competitors who represented 95 countries competing in 28 sports [16-18]. Published research on the masters athletes competing at the Sydney WMG has included investigation of smoking prevalence [19], body mass index [16, 20-27], injury incidence [28-32] and health [12, 33-41] of competitors. Much analysis has also been published in the literature on psychological motivation of Sydney WMG athletes [18, 42-50].

AIM

To analyse differences in FPG between older and younger masters athletes at the WMG to test for significant differences between groups above and below 50 years old.

METHODOLOGY

Data was collected on masters athletes participating in the Sydney WMG, after approval for the project was granted by a university Research Ethics Committee in accordance with the ethical standards of the Helsinki Declaration of 1975 (revised in 2008) and the Sydney World Masters Games Organising Committee. An online survey was created using Limesurvey, an open-source, web-based application to deliver the survey. The survey consisted of several sections, one of which required FPG data survey. A total of 485 masters athletes provided FPG data as part of this investigation. This manuscript analyses contained within the survey. Further details about the survey methodology and an overview of findings from the survey has been previously published [51].

Statistical analysis was conducted in SPSS version 25 (data exploration and independent samples t-tests). Figures were created in Python 3.6.5.

RESULTS

A total of 486 masters athletes provided FPG data as part of this investigation (277 males and 209 females). The histogram in Figure 1 displays the distribution of FPG readings in the 486 athletes. Of the males 241 reported optimal (low) FPG and 36 reported sub-optimal (high) FPG. For females 183 reported optimal (low) FPG and 26 reported sub-optimal (high) FPG.

Results were analysed split by age range, utilising the split examined in past research on the GORF [3]. The distribution of FPG for the two groups is displayed in Figure 2. The mean FPG for masters athletes below 50 years old was 5.10±1.52 mmol/L, whilst for those 50 years and above it was 5.01±1.02. An independent t-test was conducted to determine if there was a statistical difference between the groups, however the difference was not significant (t = 0.722, p = 0.471).

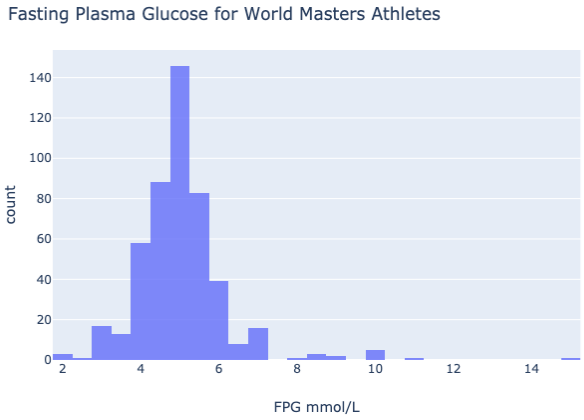

Figure 1: Fasting Plasma Glucose for WMG athletes

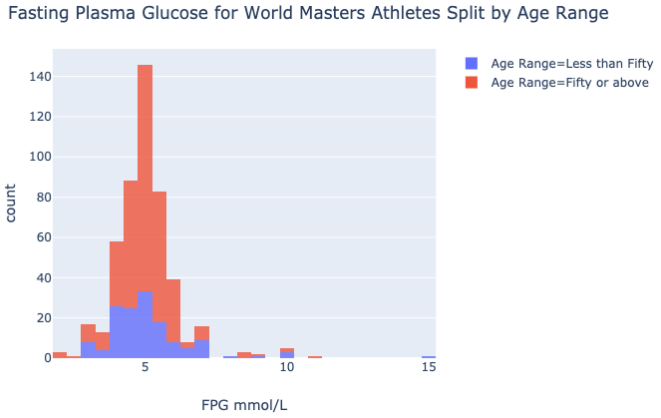

Figure 2: Fasting Plasma Glucose for WMG athletes grouped by age range

DISCUSSION

The sample size obtained for this investigation of FPG in masters athletes was more than double the number of participants in the sample used in previous research on the GORF [3]. The average age in this WMG data was less for the older masters athletes, whilst in the GORF the age was less for the younger athletes below 50 years old [3]. However, none of these patterns were statistically significant. Figure 2 demonstrates the FPG distribution was fairly consistent for the older and younger age ranges, supporting the relatively high p-value obtained in the independent samples t-test. This research supported the finding of the GORF study [3] that there was no difference in FPG between the under 50 and the 50 years old and above groups.

Similar to the GORF data [3] a large number of participants had FPG above optimal levels. In the case of a couple of participants, a very high FPG was recorded, as evidenced in Figures 1 and 2. Therefore although participation in exercise is noted to have protective benefits the age-related decline in pancreatic function may outweigh the benefits attained from masters sport participation.

CONCLUSION

This research supported the finding of the GORF study that there was no difference in FPG between the under 50 and the 50 years old and above groups. However it was observed that a large number of participants had FPG above optimal levels.

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Conflicts of interest

None.

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