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Physiological and Pathology Demographics of Veteran Rugby Athletes: Golden Oldies Rugby Festival

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***Abstract*—**Recently, the health of retired National Football League players, particularly lineman has been investigated. A number of studies have reported increased cardiometabolic risk, premature cardiovascular disease and incidence of type 2 diabetes. Rugby union players have somatotypes very similar to National Football league players which suggest that rugby players may have similar health risks. The International Golden Oldies World Rugby Festival (GORF) provided a unique opportunity to investigate the demographics of veteran rugby players. METHODOLOGIES**:** A cross-sectional, observational study was completed using an online web-based questionnaire that consisted of medical history and physiological measures. Data analysis was completed using a one sample t-test (<50yrs versus ≥50yrs) and Chi-square test. RESULTS: A total of 216 veteran rugby competitors (response rate = 6.8%) representing 10 countries, aged 35-72 yrs (mean 51.2, S.D. ±8.0), participated in the online survey. As a group, the incidence of current smokers was low at 8.8% (avg 72.4 cigs/wk) whilst the percentage consuming alcohol was high (93.1% (avg 11.2 drinks/wk). Competitors reported the following top six chronic diseases/disorders; hypertension (18.6%), arthritis (OA/RA, 11.5%), asthma (9.3%), hyperlipidemia (8.2%), diabetes (all types, 7.5%) and gout (6%), there were significant differences between groups with regard to cancer (all types) and migraines. When compared to the Australian general population (Australian Bureau of Statistics data, n=18,000), GORF competitors had a significantly lower incidence of anxiety ($p<0.01$), arthritis ($p<0.06$), depression ($p<.01$) however, a significantly higher incidence of diabetes ($p<0.03$) and hypertension ($p<0.01$). The GORF competitors also reported taking the following prescribed medications; antihypertensive (13%), hypolipidemics (8%), non-steroidal anti-inflammatory (6%), and anticoagulants (4%). Significant differences between groups were observed in antihypertensives, anticoagulants and hypolipidemics. There were significant ($p<0.05$) differences between groups (<50yrs versus ≥50yrs) with regard to height (180 vs 177cm), weight (97.6 vs 93.1Kg's), BMI (30 vs 29.7kg/m^2) and waist circumference (85.7 vs 93.1cm) however, there were no differences in subsequent parameters of systolic blood pressure, diastolic blood pressure, total cholesterol, HDL-C, LDL-C, triglycerides-C or fasting plasma glucose. CONCLUSIONS: This represents the first collection of demographics on this cohort. GORF participants demonstrated increased cardiometabolic risk with regard to the incidence of hypercholesterolemia, hypertension and type 2 diabetes. Preventative strategies should be developed to reduce this risk with education of these risks for future participants.

***Keywords*—**Masters athlete, rugby union, risk factors, chronic disease.

I. Introduction

THE Australia Rugby Union reported in 2008 that over 183,000 individuals are competing in rugby in Australia, doubling since the sport gained professional status. On a global scale, it has been estimated that five million men and women compete in rugby union matches in 117 countries. Surprisingly, the majority of research in rugby union has focused upon injuries, including catastrophic injury (cervical spinal injuries) and strength training and conditioning.

Recently, the health of professional national football league players has been investigated. Seldon et al. [1] reported increased prevalence of cardiometabolic syndrome in current NFL players and Chang and colleagues [2] had a higher incidence of impaired fasting glucose and hyperlipidemia. Tucker et al. [3] reported a higher incidence of hypertension and increased body mass index (BMI). Miller and colleagues [4] reported a prevalence of metabolic syndrome in excess of 60 percent in retired NFL players. Miller [4] concludes that

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this increased incidence may explain the increased risk of cardiovascular death in retired lineman.

It is well understood that long-term participation in exercise is associated with risk reduction to a number of chronic diseases and disorders however, Hu and colleagues [5] have reported that despite the proposed benefits of risk reduction, the risk is not completely eliminated.

Rugby union competitors may be considered a sporting cohort similar to the football lineman and consequently a population at risk. Olds [6] has previously reported that body mass and BMI in male rugby players were higher than that of the general male population, and demonstrating a rate of increase well above the general population (mass 2.6kg/decade and BMI 0.4kg/m2/decade) therefore predisposing this cohort to increased cardiometabolic risks.

The Golden Oldies Rugby Festival (GORF) is an International rugby competition held biennially and open to all rugby players aged 35 and over. It was therefore the purpose of this study to collect medical and physiological demographics on this unique cohort.

II. Methods

Ethics Approval

Institutional approval was attained from the Australian Catholic University Human Research Ethics Committee (n2010 14) and organizational approval was attained from the GORF organizing committee. Competitors provided informed consent electronically prior to enabling them access to the online research survey.

Participants

The GORF organizing committee stipulated that collection of all research data be via online therefore all participants who provided a viable email address to their club manager were eligible to participate. All electronic invitations to participate were sent to club managers directly from the GORF organizing committee with a link to a secure web address which contained the survey. Club managers were requested to forward the invitation to all of their team competitors. Participants were allowed access to the survey prior to the GORF and following completion of the GORF.

Questionnaire design

A cross-sectional, observational study was completed using an online web-based questionnaire (LimeSurvey, open source survey application). The survey consisted of three sections: basic demographics (gender, age, smoking/drinking status), medical history (personal/familial, surgical, Rx'd medications), and physiological parameters (height, weight, waist circumference, lipid profile, fasting plasma glucose).

Survey questions consisted of array, single choice, multiple choice, list dropdown, numerical input and short answer free text. Filters (where appropriate) were utilized to expedite completion of survey. The questionnaire was piloted on 70 non-participants following which only minor changes were made to medical terminology.

Statistical Analysis

All statistical analyses were performed using SPSS statistical software package (Version 17.0, Chicago Illinois, USA). Data distributions were visually inspected for normality using histograms, P-P plots, and quantitatively using the Kolmogorov-Smirnov (KS) test with Lilliefors correction. Normally distributed data were described using mean±SD, frequencies or percentages. Independent t-tests (parametric) and Pearson Chi-square (non-parametric) tests were used to determine significance between groups (<50yrs versus ≥50yrs). A p-value was set *a priori* of <0.05 to determine statistical significance.

III. Results

The GORF featured 3,198 competitors, representing nine countries competing in ten grades (1 = more competitive to 10 = fun of participation) across four levels (denoted by shorts color) in four age categories (35 to 59 years to 80 years and older). There were a total of 216 competitors (<50yrs n= 96 and ≥50yrs n=120, Fig. 1) who volunteered to participate in the survey (response rate = 6.8%). The ages ranged from 35 to 72 years (mean 51.2, S.D. ±8.0).

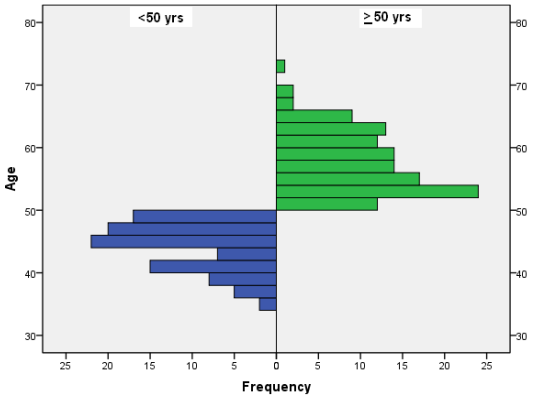

Fig. 1 Demographics of GORF participants by age

There were five age brackets for competitors, the majority (76.7%) were in the 35 to 59yr age bracket with 0.4% in the 70 to 79yr age bracket. There were no participants in the 80+ age bracket. The majority of participants (71.7%) were competing in the club shorts division (take to the ground tackle law applied), 11.2% competed in the red shorts division (player may be claimed and held but not tackled) whilst 0.9% competed in the gold shorts division (player must not be touched or tackled nor may he tackle or attempt to tackle others) and purple shorts division (player must not be touched or tackled or attempt to tackle others). The differentiation between the latter two divisions in based upon age (gold 65-69yrs and purple shorts 70-79yrs. The distribution of participants by grade and age is shown in Fig. 2.

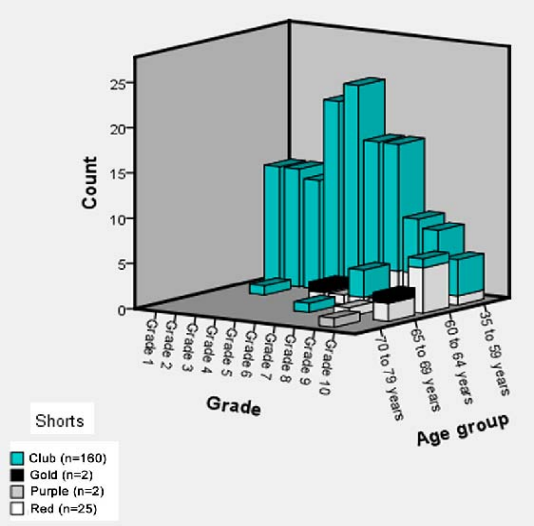

Fig. 2 Demographics of participants by grade and age group

A small percentage (8.8%) of all competitors reported they were current smokers (<50yrs 10.8% versus ≥50yrs 7.5%;), however, there was a significant difference with regard to cigarette usage between groups per week with the <50yrs group consuming a greater amount per week (93 vs 49cigs/wk, $p<0.05$). With regard to alcohol consumption, the majority (93.1%) of GORF competitors reported consuming alcohol, there was no difference however in the percentage of GORF participants consuming alcohol between groups (<50yrs 93.8% vs ≥50yrs 92.5%) or in drinks consumed per week (12.3 vs 10.2drinks/wk).

Demographics of physiological and pathology variables

The <50yrs cohort was significantly ($p<0.05$) taller, heavier and had higher BMI'S compared to the older cohort (≥50yrs, Table I). Overall, the GORF cohort demonstrated a mean BMI which categorized them as overweight (29.8kg/m^2, range 18.2 to 44.7kg/m^2) with most participants classified as either overweight or obese. There was also a significant difference with regard to waist circumference with the older (≥50yrs) cohort having a significantly larger waist circumference, however a higher percentage of the older cohorts had waist circumferences within the optimal range.

With regard to blood pressure [7], there was no difference between groups in either resting systolic or diastolic blood pressures with the GORF cohort being classified as pre-hypertensive for systolic blood pressures and normotensive for diastolic blood pressures (Table I). A non-significant, higher percentage of the <50yrs group was classified as normotensive with regard to resting systolic blood pressure whilst both groups were similar with regard to the percentage of competitors classified as normotensive diastolic blood pressures.

There was no difference with regard to lipids (total cholesterol, HDL-C, LDL-C, triglycerides [7]) between the two groups (Table I). There was no trend with regard to optimal percentage of competitors, either <50yrs or ≥ 50yrs however, both groups demonstrated an optimal percentage of HDH-C. Surprisingly, both groups had a low percentage (26.6% vs 44.4%) of competitors with triglycerides in the optimal range. There was also no difference with regard to fasting plasma glucose (FPG) between groups.

Demographics of medical diseases/disorders and prescribed medications

GORF competitors reported 15 major common medical disorders (Fig. 1), with significant differences between groups reported in the incidence of cancer (all types) and migraines. The majority (17.6%) of the competitors reported hypertension, followed by asthma (10.0%) and arthritis (RA/OA, 10.0%) and hyperlipidemia (9.0%).

For comparative purposes, data from the Australian National Health Survey 2007-2008 was obtained via the ABS/Universities Australia Agreement. When compared to the GORF cohort (Table II), they reported a significantly lower incidence of anxiety, arthritis (OA/RA) and depression. However, the GORF cohort also reported a significantly higher incidence of diabetes (all types) hyperlipidemia and hypertension.

TABLE II
INCIDENCE OF GORF PARTICIPANTS COMPARED TO AUSTRALIAN GENERAL POPULATION (* CHI-SQUARE, $p<0.05$ BETWEEN GROUPS, NS = NON-SIGNIFICANT)

Disorder	GORF Survey cohort (n=216)	ABS [9] (n=18,000)	Significance (P)
Anxiety (%)	0.0	3.0	.01
Arthritis (%)	11.5	15.0	.06
Asthma (%)	9.3	10.0	NS
Cancer (%)	3.2	2.0	NS
Depression (%)	3.2	6.0	.01
Diabetes (%)	7.5	4.0	.03
Hyperlipidemia (%)	8.2	6.0	NS
Hypertension (%)	18.6	11.0	.01

GORF competitors reported 13 types of commonly prescribed medications (Fig. 2), there were significant differences between groups with regard to anti-hypertensives, anticoagulants and hypolipidemics. Commensurate with the high incidence of hypertension among competitors was a high (17.5%) incidence of being prescribed anti-hypertensive medications. Surprisingly, no competitors in the <50yrs group reported being prescribed an anticoagulant whereas 9.2% of the ≥50yrs reported being prescribed an anticoagulant.

IV. DISCUSSION

Although only a small sample of GORF competitors participated in the study, the 216 who provided demographic data provided an initial insight into the medical and physiological demographics of veteran rugby players. Surprisingly, the GORF competitors reported an incidence, both higher and lower of chronic diseases and disorders as compared to the Australian general population, which was matched for age range and gender. It may have been

presumed that the GORF cohort would have demonstrated a significantly lower incidence of common chronic diseases and disorders simply due to their participation in sport. However, when consideration is given to the increased mass and BMI in this cohort, this increases their susceptibility to increased mass related disorders such as cardiovascular (coronary heart disease, hypertension), musculoskeletal (arthritis), respiratory (sleep apnea) and endocrine (diabetes), all of which were reported in the GORF cohort [10].

With regard to vascular diseases, although the GORF cohort demonstrated a significantly higher incidence of hypertension compared to the Australian population, conversely the GORF cohort had a lower incidence of coronary artery disease (2.5%) and angina (3.3%). All reported coronary artery disease reported was in the older cohort whilst the majority (80%) of those reporting angina was in the older group.

Metabolic disorders, specifically diabetes was largely (75%) reported in the older cohort despite a similar percentage of competitors BMI's classified as overweight or obese, waist circumferences in the non-optimal range and fasting plasma glucose in the non-optimal range. Although participation in exercise is noted to have protective benefits [5] the age-related decline in pancreatic function may outweigh the benefits attained from rugby participation.

TABLE I

PHYSIOLOGICAL AND PATHOLOGICAL DEMOGRAPHICS (*INDEPENDENT SAMPLES T-TEST, $P<0.05$ BETWEEN GROUPS) §BMI, BODY MASS INDEX: AN INDICATOR OF BODY FAT CALCULATED BY WEIGHT (KG)/ HEIGHT^2 (M). NORMAL VALUES RANGE FROM 18.5 – 24.9KG/M^2. VALUES $\geq$25KG/M^2 ARE CONSIDERED OVERWEIGHT, AND $\geq$30KG/M^2 OBESE. $^{\Omega}$WAIST CIRCUMFERENCE, OPTIMAL FOR MALES <94CM; $^{£}$SBP, SYSTOLE BLOOD PRESSURE: NORMAL VALUES RANGE FROM <120MMHG, PRE-HYPERTENSIVE VALES RANGE FROM >120-139MMHG, STAGE 1 HYPERTENSIVE VALES RANGE FROM >140-159MMHG, STAGE 2 HYPERTENSIVE VALES RANGE FROM >160MMHG. ^{ff}DIASTOLIC BLOOD PRESSURE: NORMAL VALUES RANGE FROM <80MMHG, PRE-HYPERTENSIVE VALES RANGE FROM >80-90MMHG, STAGE 1 HYPERTENSIVE VALES RANGE FROM >90-99MMHG, STAGE 2 HYPERTENSIVE VALES RANGE FROM >99MMHG §TC, TOTAL CHOLESTEROL, OPTIMAL $\leq$5.5MMOL/L; §§HDL-C, HIGH-DENSITY LIPOPROTEIN CHOLESTEROL, HDL-C, OPTIMAL $\geq$1.0MMOL/L; LDL-C, §§§LOW-DENSITY LIPOPROTEIN CHOLESTEROL, OPTIMAL $\leq$ 2.0MMOL/L; §§§TRIGLYCERIDE-C, OPTIMAL $\leq$ 1.7/L; $^{\Diamond}$FPG, FASTING PLASMA GLUCOSE, OPTIMAL <5.5MMOL/L

Variable	GORF Survey cohort (n=216)	<50yrs (n=96)	≥50yrs (n=120)
Height (cm's)	178.8±9.7	180.4±8.3	177.4±10.7*
Mass (kg's)	95.2±15.4	97.6±16.7	93.1±13.8*
BMI § (n=6083, kg/m^2)	29.8±4.2	30.0±4.2	29.7±4.2*
Underweight (%)		0.0	1.1
Normal BMI (%)		8.1	8.5
Overweight (%)		48.8	53.2
Obese (%)		43.0	37.2
Waist $^{\Omega}$ (cm's)	89.8±19.7	85.7±21.8	93.1±17.2*
Optimal		46.2%	53.8%
SBP $^{£}$ (mmHg)	124.0±15.8	121.0±16.1	125.7±15.6
Normal (%)		59.5	40.2
Pre-HTN (%)		29.7	40.2
Stage 1 HTN (%)		10.8	17.9
Stage 2 HTN (%)		0.0	1.0
DBP ^{ff} (mmHg)	77.7±9.9	77.5±10.9	77.8±9.4
Normal (%)		70.3	73.1
Pre-HTN (%)		18.9	17.9
Stage 1 HTN (%)		10.8	7.5
Stage 2 HTN (%)		0.0	1.5
TC § (mmol/L, n=80)	4.9±1.5	4.5±1.6	5.0±1.5
Optimal (%)		39.6%	60.4%
HDL-C §§ (mmol/L, n=46) Optimal	1.5±0.85	1.3±0.7 70.5%	1.5±0.9 86.2%
LDL §§§ (mmol/L, n=40)	2.5±1.2	2.1±1.3	2.8±1.1
Optimal (%)		50.0%	26.9%
Trigs-C §§§§ (mmol/L, n=41) Optimal (%)	2.5±1.2	2.8±1.3 28.6%	2.4±1.1 44.4%
FPG (mmol/L, n=42) $^{\Diamond}$	5.7±2.9	5.5±3.4	5.8±2.6
Optimal (%)		75.0%	50.0%

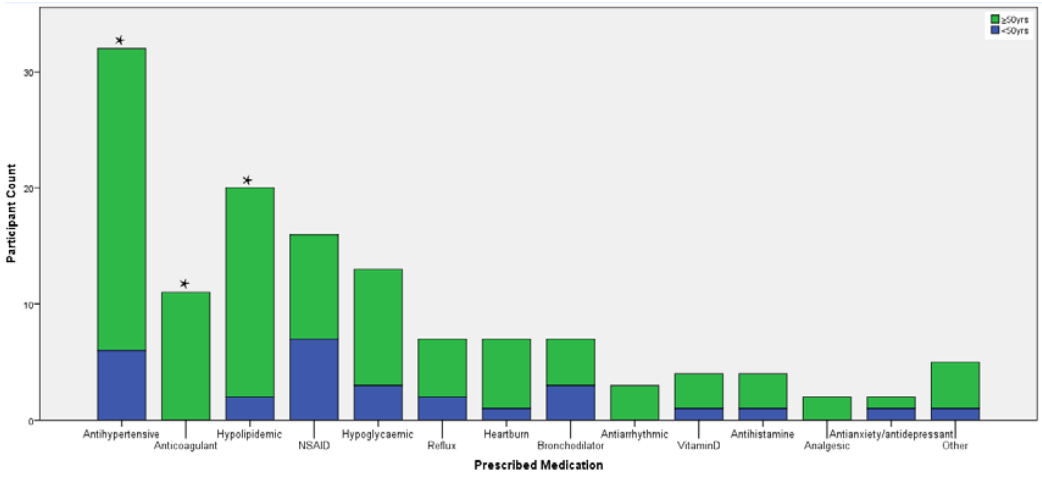

Fig. 2 Prescribed medications in GORF competitors (*Chi-Square, p<0.05 between groups)

V. Conclusion

It is widely recognized that ageing is associated with deteriorating physiological and pathology measures however, this was not evident with regard to the GORF cohort. The younger cohort (<50yrs) did demonstrate a significantly lower waist circumference commensurate with a higher BMI which may simply be attributed to increased muscle mass. Resting blood pressures, lipid profile and glycaemia did not differ significantly between cohorts yet the younger group did not continually demonstrate the highest percentage of optimal readings. This suggests that participation in rugby in advanced age may offer reduced but not eliminated cardiovascular or cardiometabolic risk. Arguably, the younger cohort reported a higher incidence of most chronic medical conditions. This may be reflective of the differing lifestyles or reduced protection from decreased years of participation in rugby.

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