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When Military Fitness Standards No Longer Apply: The High Prevalence of Metabolic Syndrome in Recent Air Force Retirees

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ABSTRACT Background: Metabolic syndrome (MetS) is strongly associated with cardiovascular disease. With MetS prevalence rates increasing in the U.S. population, prevention efforts have largely focused on diet and exercise interventions. Before retirement, military service members have met fitness requirements for at least 20 years, and have lower MetS rates compared to age-matched U.S. population controls (23.4% vs. 39.0%), which suggests a protective effect of the lifestyle associated with military service. However, MetS rates in military retirees have not been previously reported, so it is unknown whether this protective effect extends beyond military service. The purpose of this study was to examine the prevalence of MetS and individual diagnostic criteria in a population of recent U.S. Air Force (USAF) retirees. Methods: We obtained institutional review board approval for all participating sites at Wilford Hall Ambulatory Surgical Center. From December 2011 to May 2013, USAF retirees within 8 years of their date of retirement were recruited at five USAF bases. Consenting subjects underwent examination and laboratory studies to assess the five diagnostic criteria measures for MetS. We used binary logistic regression to examine the relationship between various factors and the presence of MetS. Results: The study population (n = 381) was primarily male (81.9%), enlisted (71.1%) and had a mean age of 48.2 years. When applying the American Heart Association MetS diagnostic criteria to this population, the MetS prevalence was 37.2%. When using alternative diagnostic criteria found in other published studies that did not include the use of cholesterol medications, the MetS prevalence was 33.6%. Per American Heart Association criteria, the prevalence of each of the MetS diagnostic criteria was as follows: central obesity, 39.8%; elevated fasting glucose, 32.4%; high blood pressure, 56.8%; low-high-density lipoproteins cholesterol, 33.3%; and elevated triglycerides, 42.7%. MetS was more common among males (odds ratio [OR] = 4.05; confidence interval [CI] = 1.94, 8.48) and enlisted (OR = 2.23; CI = 1.24, 4.01). It was also strongly associated with a history of participating in the Air Force Weight Management Program (OR = 2.82; CI = 1.41, 5.63) and increased weight since retirement (OR = 4.00; CI = 1.84, 8.70). However, the study did not find an association between the presence of MetS and time since retirement or self-reported diet and exercise changes since retirement. Conclusions: The MetS prevalence among recent USAF retirees represents a shift from age-matched active duty rates toward higher rates described in the overall U.S. population. This finding suggests the protective health effects of fitness standards may be reduced shortly after retirement. This is true despite activities such as screening before and during military service and exposure to USAF health promotion efforts and fitness standards throughout a period of active duty service lasting at least 20 years. In general, military members should be counseled that on retirement, efforts to maintain a healthy weight have continued benefit and should not be forgotten. The risk of MetS after retirement is particularly increased for those identified as being overweight during their active duty careers. Interventions that prevent and reduce unhealthy weight gain may be an appropriate investment of resources and should be studied further.

INTRODUCTION

Recognition of the association of multiple cardiovascular disease (CVD) risk factors, including abdominal obesity, hyperglycemia, dyslipidemia, and hypertension along with metabolic changes, including insulin resistance, has led to the identification of a syndrome that is now most commonly termed metabolic syndrome (MetS).[1–4] The National Health and Nutrition Examination Survey (NHANES) 2003–2006 measured the age-adjusted prevalence of MetS in the U.S. adult population over 20 years of age to be 34%.[5] The prevalence of MetS increases with age, and the age group most similar to recent U.S. Air Force (USAF) retirees is 40 to 59 years of age, in which the MetS prevalence is 39.0%.[5] Prevalence of individual risk factors in the 40- to 59- year-old category across the general population includes central obesity (52.8%), hypertension (39.5%), hyperglycemia (38.6%), hypertriglyceridemia (31.2%), and low-high-density lipoproteins (HDL) cholesterol (24.7%).[5]

Prevention of MetS primarily involves diet and exercise programs.[6] During active duty military service, USAF members are encouraged to establish healthy lifestyle choices, including diet and exercise. For example, the Air Force Fitness Program assesses both body composition and exercise capacity of active duty members every 6 months. The assessment includes height, weight, abdominal circumference, push-ups, abdominal crunches, and the 1.5-mile run.

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Members who fail to meet minimum standards enter a remediation program to meet appropriate standards.[7] Furthermore, to assure readiness for the military mission, the yearly Periodic Health Assessment targets CVD risk factors by encouraging a healthy diet, physical activity, and periodically measuring blood pressure and lipid values.[8] Before 2003, the Air Force Weight Management Program authorized administrative actions against those members that did not meet weight to height standards. Although the current Fitness Program emphasizes overall fitness, the Weight Management Program required commanders to track members solely on the basis of weight and body composition requirements. Members who did not make adequate progress toward the minimum standards over time usually received administrative separation from the military.[9] Thus, although the focus of specific programs have changed over time, the Air Force has systematically incorporated incentives for its members to maintain overall fitness standards that include both weight/body composition and exercise capacity standards.

Herzog et al[10] reported the prevalence of MetS among all active duty members age 45 to 64 in 2012 to be 23.4%. This compares favorably with the NHANES data, which shows prevalence among individuals age 40 to 59 in the general population to be 39.0%,[5] suggesting a protective health effect of military fitness standards. Although health promotion programs are encouraged during the active duty military member's career, the impact of these programs after military retirement is unknown. There have been anecdotal concerns that after retirement, when individuals are no longer exposed to stringent fitness requirements and health promotion programs, members may have worsened diet and exercise practices, which may lead to increased risk for CVD. High rates of obesity have been reported in the military veteran population.[11] Moreover, self-reported weights have revealed rates of overweight and obesity among veterans similar to the general population.[12,13] However, no studies have been conducted to examine development of MetS after military retirement.

The purpose of this study was to obtain information regarding the MetS prevalence and specific MetS components in a population recently retired from the USAF. This information may be used to guide recommendations regarding screening and prevention efforts during active duty service, at the time of military retirement, and after retirement to lower long-term CVD risk.

METHODS

Subject Recruitment

The Wilford Hall Ambulatory Surgical Center (WHASC) Institutional Review Board approved our protocol and reciprocal agreements with collaborating facilities. In an effort to obtain a representative sample of USAF retired population and decrease selection bias, recruitment for this study attempted to reach eligible USAF members at the following sites: Keesler Air Force Base (AFB), Mississippi; Nellis AFB, Nevada; Lackland AFB, Texas; Wright-Patterson AFB, Ohio; and Travis AFB, California. We recruited about half of the participants from Wright-Patterson AFB (52.5%) and more than one quarter from Keesler AFB (26.8%). Retirement was defined as those who served a minimum of 20 years in the USAF. Furthermore, as a pragmatic choice, to be considered "recent" retirees, participants must have retired within the past 8 years.

Exclusion criteria were primarily factors with potential to affect abdominal circumference including pregnancy, abdominal surgery within 1 year, history of weight loss surgery at any time, and use of weight loss medication within the past year. Study participants did not receive compensation.

We identified potential study subjects through an electronic database at each collaborating medical center. We identified subjects through telephone calls and letters to subjects noted to be retired less than 8 years. Individuals who expressed interest in participating in the study met in person with the Principal Investigator or a designated Associate Investigator to discuss consent and participation in the study.

Data Collection

We consented and enrolled participants in the study from December 2011 to May 2013. The study design allowed for participants to be interviewed and measured in person. We collected the data during one study-specific visit that included a self-report questionnaire focused on demographics and health-related behaviors, an examination to obtain height and weight (used to calculate body mass index [BMI]), blood pressure, abdominal circumference, and laboratory blood tests including fasting blood glucose and lipid panel. Furthermore, we asked participants if they were taking medication to treat hypertension, dyslipidemia, or hyperglycemia.

Demographics included gender, age, race/ethnicity, and rank at retirement. In addition, we asked participants if they ever participated in the Air Force Weight Management Program or failed an Air Force Fitness Test.

Health-related behaviors included the amount of current exercise compared to when they were active duty and amount of calories consumed currently compared to when they were active duty. Responses included 1 = much less; 2 = slightly less; 3 = same; 4 = slightly more; and 5 = much more. For analysis, responses were recoded into three categories: (1) decreased, (2) same, or (3) increased to aid interpretation.

We also asked participants how their current weight compared to their weight at retirement. Responses included A = 1 to 9 pounds more; B = 10 to 20 pounds more; C = 20 pounds more; D = same; E = 1 to 9 pounds less; F = 10 to 20 pounds less; or G = 20 pounds less. For analysis, responses were collapsed into three categories: (1) decreased, (2) same, or (3) increased to aid interpretation.

We used the American Heart Association (AHA) criteria, endorsed by the National Heart, Lung and Blood Institute (NHLBI), to define MetS. If individuals met three of the following five criteria they were considered to have MetS: (1) abdominal waist circumference ≥102 cm (≥40 inches) in men or ≥88 cm (>35 inches) in women; (2) triglycerides ≥150 mg/dL; (3) HDL cholesterol <40 mg/dL in men or <50 mg/dL in women; 4) blood pressure ≥130/85; and (5) fasting glucose ≥100 mg/dL.[14] In addition, subjects met the respective diagnostic criteria if they reported taking medications for diabetes, hypertension, or hypertriglyceridemia. To minimize the potential confounder for counting the same cholesterol medication twice (for hypertriglyceridemia and low-HDL cholesterol), we only allowed medication use to count in the triglyceride category. We note that two of our referenced studies[5,10] did not consider subjects to have met the MetS diagnostic criterion for hypertriglyceridemia solely on the basis of taking cholesterol medications; therefore, we recalculated prevalence to account for this difference when comparing our results to the populations in these studies.

We conducted statistical analyses using SPSS, version 19 (IBM, Armonk, New York). Univariate analysis revealed less than 1% missing data. Descriptive statistics characterized demographic and behavioral factors in the sample, as well as prevalence of MetS and diagnostic criteria.

RESULTS

The cohort (N = 381) was primarily male (81.9%), enlisted at retirement (71.1%) and had a mean age of 48.2 years (Table I). During their careers, 15.3% of study subjects were enrolled in the Air Force Weight Management Program and 28.9% failed an Air Force Fitness Test. In addition, self-reported changes since retirement included 69.1% of subjects reporting increased weight and 61.3% reporting decreased exercise, with only 24.7% acknowledging increased caloric intake.

The prevalence of MetS in the overall population was 37.2% (Table II) and was highest in the 6 to 8 year post-retirement group. The prevalence of each of the MetS diagnostic criteria was as follows: central obesity (39.8%); hyperglycemia (32.4%), hypertension (56.8%); low-HDL cholesterol (33.3%); and hypertriglyceridemia (42.7%). Of note, central obesity increased gradually after retirement.

Table III shows our Binary Logistic Regression analyses to examine MetS across demographic and behavioral variables (Table III). The overall model was significant, χ^2 = 85.54, $p < 0.0001$. MetS was nearly 4 times more likely in males (odds ratio [OR] = 4.05; confidence interval [CI] = 1.94, 8.48) relative to females. In addition, MetS was twice as likely if the retiree was enlisted (OR = 2.23; CI = 1.24, 4.01) relative to officers.

Furthermore, those with a history of participation in the Air Force Weight Management Program were nearly three times more likely to have MetS (OR = 2.82; CI = 1.41,5.63) relative to those who were never in the Program. Behavior since retirement indicated retirees who increased weight since retirement (OR = 4.00; CI = 1.84, 8.70) were four times more likely to have MetS relative to those whose weight remained the same. No statistically significant association was found between the presence of MetS and other factors, including time since retirement, or self-reported diet and exercise changes since retirement.

TABLE I. Characteristics of USAF Retiree Subjects (N = 381)

Characteristics	N (%)
Gender	
Male	312 (81.9)
Female	69 (18.1)
Age (Years)	
<45	73 (19.2)
45–49	173 (45.4)
≥50	135 (35.4)
BMI	
<24.9 (Underweight or Normal)	72 (18.9)
25–29.9 (Overweight)	157 (41.2)
>30 (Obese)	152 (39.9)
Rank	
Enlisted	271 (71.1)
Officer	110 (28.9)
Ethnicity	
White	299 (79.1)
Hispanic/Latino	19 (5.0)
Black/African American	49 (13.0)
Other	11 (3.9)
Years Since Retirement	
<2	91 (23.9)
2–3	98 (25.7)
4–5	137 (36.0)
≥6	54 (14.2)
Assigned to Weight Management Program	
Yes	58 (15.3)
No	322 (84.7)
Failed Air Force Fitness Test	
Yes	110 (28.9)
No	271 (71.1)
Exercise Since Retirement	
Increase	59 (15.5)
Same	88 (23.2)
Decreased	233 (61.3)
Caloric Intake Since Retirement	
Increase	93 (24.7)
Same	217 (57.7)
Decreased	66 (17.6)
Weight Since Retirement	
Increase	262 (69.1)
Same	65 (17.2)
Decreased	52 (13.7)

Figure 1 depicts the prevalence of each of the individual risk factors for MetS in this study and the overall prevalence of individual risk factors across the NHANES 2003–2006 study population.[5] One salient difference in calculating MetS prevalence was that our study followed AHA/NHLBI criteria by counting subjects who were currently taking a medication for dyslipidemia in the hypertriglyceridemia category; however, the Ervin study did not include this group in its review of the NHANES data. When we adjusted for this difference,

TABLE II. Presence of Metabolic Syndrome Criteria in USAF Retiree Subjects

Characteristics	Overall n (%)(n = 381)	<2 Years(n = 91)	2–4 Years(n = 98)	4–6 Years(n = 137)	6–8 Years(n = 54)
Metabolic Syndrome	140 (37.2)	29 (32.2)	43 (44.3)	41 (30.4)	27 (50.0)
Central Obesity[a]	151 (39.8)	29 (31.9)	39 (39.8)	55 (40.4)	28 (51.9)
Fasting Glucose[b]	123 (32.4)	27 (29.7)	39 (39.8)	33 (24.1)	24 (44.4)
Blood Pressure[c]	216 (56.8)	45 (49.5)	59 (60.2)	77 (56.2)	35 (64.8)
HDL-C[d]	126 (33.3)	31 (34.4)	39 (39.8)	38 (27.9)	18 (33.3)
Triglycerides[e]	162 (42.7)	36 (39.6)	47 (48.5)	50 (36.5)	29 (53.7)

[a]Waist circumference >102 cm or 40 inches (male), >88 cm or 35 inches (female). [b]Fasting glucose ≥100 mg/dL or taking diabetes medication. [c]Blood pressure ≥130/85 mm Hg or taking blood pressure medication. [d]HDL-C <40 mg/dL (male); <50 mg/dL (female). [e]Triglycerides ≥150 mg/dL or taking cholesterol medication.

the prevalence of MetS in our group was 33.6% vs. 39.0% in the NHANES population.

DISCUSSION

Summary of Findings

The results of this study of recent USAF retirees revealed a number of important findings. First, the overall MetS prevalence of 37.2% per AHA/NHLBI criteria (33.6% adjusted as described earlier) represents a shift from the previously published prevalence rates of age-matched active duty members (23.4%)[10] toward the prevalence described in the age-matched U.S. general population (39.0%).[5] This finding suggests that the protective health effects of military fitness standards are reduced shortly after retirement. Moreover, the prevalence of each of the individual risk factors for MetS

TABLE III. Demographics and Behavioral Characteristics of USAF Retiree Subjects

Variable	No Metabolic Syndrome (N [%])	Metabolic Syndrome (N [%])	B (SE)	Wald (χ^2)	Odds ratio (95% CI)	p Value
Gender						
Male	183 (59.2)	126 (40.8)	1.40 (0.38)	13.79	4.05 (1.94, 8.48)	<0.001
Female	54 (79.4)	14 (20.6)	–	–	1.00	–
Age (Years)						
<45	46 (63.9)	26 (36.1)	−0.14 (0.37)	0.14	0.87 (0.42, 1.80)	0.71
45–49	103 (60.6)	67 (39.4)	−0.07 (0.28)	0.07	0.86 (0.49, 1.50)	0.80
≥50	88 (65.2)	47 (34.8)	–	–	1.00	–
Rank at Retirement						
Enlisted	155 (57.6)	114 (42.4)	0.80 (0.30)	7.10	2.23 (1.24, 4.01)	0.008
Officer	82 (75.9)	26 (24.1)	–	–	1.00	–
Time Since Retirement						
<2	61 (67.8)	29 (32.2)	–	–	1.00	–
2–4 years	54 (55.7)	43 (44.3)	0.44 (0.35)	1.58	1.56 (0.78, 3.11)	0.21
4–6 years	94 (69.6)	41 (30.4)	0.01 (0.34)	<0.001	1.01 (0.51, 2.00)	0.99
6–8 years	27 (50.0)	27 (50.0)	0.55 (0.42)	1.72	1.72 (0.75, 3.95)	0.20
Weight Management Program While Active Duty						
No	215 (67.4)	104 (32.6)	–	–	1.00	–
Yes	22 (38.6)	35 (61.4)	1.04 (0.35)	8.56	2.82 (1.41, 5.63)	0.003
Failed Fitness Test						
No	176 (65.7)	92 (34.3)	–	–	1.00	–
Yes	61 (56.5)	47 (43.5)	0.17 (0.28)	0.35	1.18 (0.68, 2.05)	0.56
Exercise Since Retired						
Decreased	128 (55.7)	102 (44.3)	0.36 (0.33)	1.19	1.43 (0.75, 2.74)	0.28
Same	68 (77.3)	20 (22.7)	–	–	1.00	–
Increased	41 (70.7)	17 (29.3)	0.30 (0.46)	0.43	1.35 (0.55, 3.23)	0.51
Caloric Intake Since Retired						
Decreased	47 (72.3)	18 (27.7)	0.04 (0.37)	0.01	1.04 (0.50, 2.14)	0.92
Same	139 (64.7)	76 (35.3)	–	–	1.00	–
Increased	50 (54.3)	42 (45.7)	0.10 (0.29)	0.11	1.10 (0.63, 1.95)	0.74
Weight Change Since Retired						
Decreased	45 (86.5)	7 (13.5)	−0.60 (0.61)	0.97	0.55 (0.17, 1.81)	0.33
Same	54 (84.4)	10 (15.6)	–	–	1.00	–
Increased	136 (52.5)	123 (47.5)	1.39 (0.40)	12.22	4.00 (1.84, 8.70)	<0.001

Model summary: χ^2 = 85.54, df = 15, p < 0.0001.

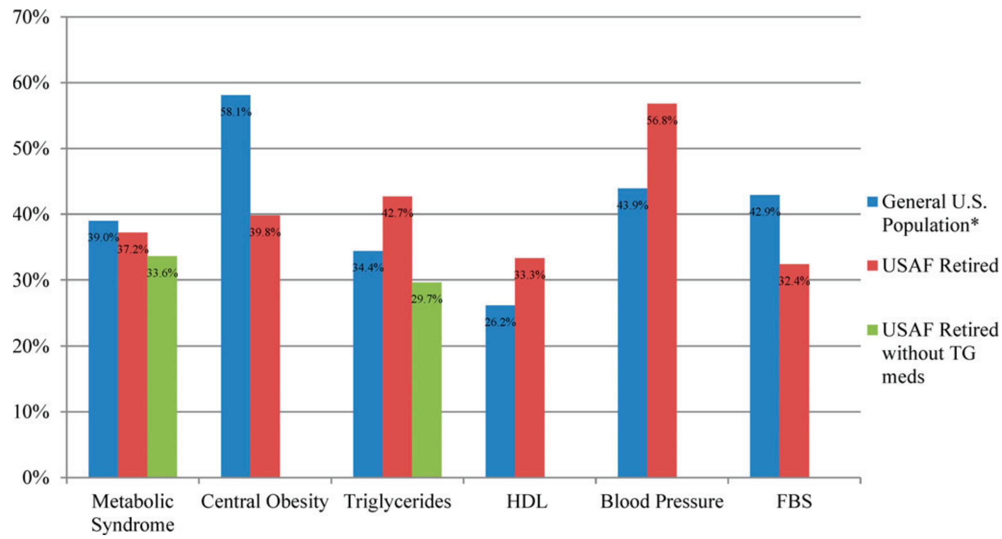

FIGURE 1. Comparison of metabolic syndrome criteria in USAF retired to general population (40–59 years old). In contrast to the AHA definition, the Ervin study did not consider individuals taking cholesterol medications to be meeting the hypertriglyceridemia criteria. Included are USAF retired rates in this category according the AHA definition and according to the Ervin study definition. *Ervin (2009).

raises concern. Finally, the factors associated with MetS including gender, age, military status at retirement, and prior participation in the Air Force Weight Management Program, along with the self-reported changes in weight, suggest factors to be targeted by health promotion and preventive medicine efforts in the future. Although we cannot definitively determine cause and effect from this study, our findings suggest that when a military member no longer has mandatory fitness standards after retirement, there is decreased motivation to maintain healthy weight. The majority (69.1%) of our participants reported gaining weight after retirement (Table I), and the major behavioral changes were decreased exercise (61.3%) coupled with the same (57.7%) or increased (24.7%) caloric intake, which suggests these factors contributed to increased weight. Interestingly, only weight gain, and not the individual contributors, was strongly correlated with the presence of MetS (OR = 4.0; Table III), which suggests that combined effect of weight gain itself, rather than the exercise level, caloric intake, or other individual contributors, may be the most important aspect in the development of MetS.

Comparison to Other Studies

In the NHANES study, the age group of 40 to 59 years old, which is most closely aligned with the USAF retiree population in this study (mean age 48.2 years), had an overall MetS prevalence of 39.0%.[5] Although it is difficult to directly compare this population with our study population because of differences in MetS diagnostic criteria and differing age classification strategies, the USAF retiree MetS prevalence of 37.2% suggests the rate in USAF retirees is moving toward the general U.S. population. When we aligned our hypertriglyceridemia criterion definition with the NHANES study (eliminating those who are on medication to treat dyslipidemia), the adjusted rate of MetS in our population was lower at 33.6%. Considering the active duty rate of 23.6%,[10] this still represents a significant shift; thus, it appears that there is a rise in MetS prevalence shortly after retirement.

Although the MetS prevalence is lower in active duty members, data suggest the prevalence of some individual risk factors for CVD used to define MetS have been increasing in the active duty population, mirroring increases seen in the general U.S. population. In a 13-year retrospective analysis of U.S. military personnel, Reyes-Guzman et al[13] found the prevalence of overweight and obesity rose more than 60% between 1995 and 2008. In 1995, the prevalence of those with a BMI of $\geq$25 kg/m^2 was 50.6%, increasing to 60.8% in 2008. Furthermore, obesity as defined by a BMI of $\geq$30 kg/m^2 rose from 5.0% to 12.7%; some of the largest increases were observed in enlisted personnel and women.

Moreover, the Health Profile of the Department of Defense (DoD), published in 2011, revealed some insight regarding the CVD risk factors in the active duty military population, including changes over time.[15] The report stated the rate of obesity more than doubled across all branches of the DoD increasing from 5.1% in 1995 to 13.2% in 2008. Similar to the general population, the prevalence of obesity in the DoD population in 2008 was 13.8%, with another 22.6% being overweight as defined by BMI. In addition, 17% were defined as having high blood pressure and 19% with hypertriglyceridemia.[15] This may explain the finding in our study that those over 50 years of age actually had a higher prevalence of MetS than the age categories of 45 to 49 and <45 years old. Of note, a similar finding was seen in self-reported responses to the Population Health Survey among military retirees and their spouses, age 38 to 64 years. In this population, obesity rates were lower for those ≥60 years of age (OR = 0.72, CI = 0.61, 0.84), when compared to those <50 years of age.[16]

We observed disparity in the prevalence of MetS according to rank at retirement, as 42.4% of retired enlisted compared to 24.1% of retired officers met the criteria for MetS. Reyes-Guzman et al found active duty military weight trends confirming that enlisted personnel are significantly more likely than officers to be overweight and obese; thus, this trend persists into retirement.[13] Moreover, these findings are consistent with the correlation of lower socioeconomic status and poorer health outcomes as "fundamental causes" of disease.[17,18] Officers are more likely to have a higher level of education, which is a strong predictor of better health even when individuals have achieved comparable income levels.[19] Those with higher levels of education are more likely to identify symptoms of health problems, to seek information about treatment, and to more effectively cope with health-related stress.[17,19]

LIMITATIONS

There are several limitations to this study. First, although this study was open to all retired USAF at the sites collecting data, there can be no assumption that the sample is representative of the entire retired USAF population. All participation was voluntary and the majority of participants were from Wright-Patterson AFB. In addition, there are many retired USAF members who have second careers and do not receive medical care from military sources. While we could have pursued a comprehensive Air Force-wide database study of recent retirees which would have provided a larger sample, our choice of study design allowed for direct interview, specific labwork, and abdominal circumference measurement of subjects that we could not have accomplished in a broader enterprise-wide study.

Second, it was not a longitudinal study in that the study did not follow the same individuals over time. Subjects within each time category are different, which enables other unmeasured factors to confound the results. Although a longitudinal study might be stronger, such a study would have been time and cost prohibitive.

Third, weight and exercise standards changed during the careers of the members in this study.[20,21] Between 1992 and 2003, the USAF used cycle ergometry as its primary means of exercise capacity assessment. After 2003, the USAF returned to its current test format of height, weight, abdominal circumference, push-ups, sit-ups, and the 1.5-mile run.[21] This design did not account for a change in standards, but merely identified those who failed to meet fitness standards at any point in their careers.

Finally, the number of female retirees in our study is small, but approximates the actual percentage of female service members[22]; therefore, conclusions about female retirees must be interpreted with caution.

IMPLICATIONS FOR PRACTICE

The strongest association with the presence of MetS in this group of USAF retirees was a history of enrollment in the Air Force Weight Management Program; 61.4% of those who were in a weight management program while on active duty had MetS within 8 years of retirement. Furthermore, after retirement, 47.5% of those who reported gaining weight had MetS. It is perhaps not surprising that the failure to meet weight standards during active duty service predicts risk for MetS after retirement. This finding and the lack of association of MetS with a history of failing the Air Force Fitness Test suggests a particular need to focus CVD risk reduction efforts on those active duty members and retirees with central obesity and overweight status. Interventions that target this subpopulation need to support lifestyle changes that decrease CVD risk factors during military service and beyond.

FURTHER RESEARCH

Further study is needed to determine the pattern and determinants of CVD risk factors throughout military service, with an ultimate goal of understanding effective preventive measures that could translate to retired military transitioning to civilian populations.

Additionally, this study revealed higher rates of MetS in males compared to females, 40.8% vs. 20.6% (OR = 4.05; CI = 1.94, 8.48), per AHA diagnostic criteria (36.6% vs. 20.3% using the adjusted Ervin criteria). The NHANES data report also found a higher prevalence of MetS in males vs. females (40.8% vs. 37.2%) for the 40- to 59-year-old age group in the general U.S. population, but to a much lesser extent.[5] While the sample of retired females in our study was small, it is possible that the lower MetS rates seen in female USAF retirees was the result of a more selective population of females joining the USAF and remaining until retirement. Given that roughly 20% of the USAF active duty members are female,[22] one could postulate that the pool of female USAF retirees represents a more selective group than the pool of male retirees, and consequently less likely to develop CVD risk factors. Future investigators may want to oversample female retirees to capture the broader picture concerning the prevalence and impact of MetS on females.

CONCLUSION

Given the prevalence of MetS and the individual diagnostic criteria defining the syndrome revealed in this study of recent USAF retirees, this population has rates of CVD risk factors moving toward that of the general population. This is true despite activities such as screening before and during military service and exposure to USAF health promotion efforts and fitness standards throughout a period of active duty service lasting at least 20 years. In general, military members should be counseled that on retirement, efforts to maintain healthy weight have continued benefit and should not be forgotten. The risk of MetS after retirement is particularly increased for those identified as being overweight during their active duty careers. Interventions that prevent and reduce unhealthy weight gain may be a good investment of resources and should be studied further.

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