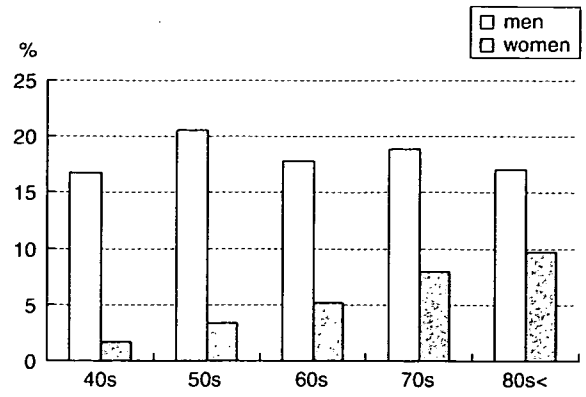

Fig 1. Prevalence of metabolic syndrome by age group in the studied population for each gender. The number of studied subjects was 7,329 men and 14,541 women. The survey was conducted from May 1, 2005 through to October 31, 2005. Age is shown as the median (1st, 3rd quartile). For men, p-values were not statistically significant. For women, p<0.0001 using the standard chi-square test. Men, age 68 (63–75); women, age 66 (60–72).

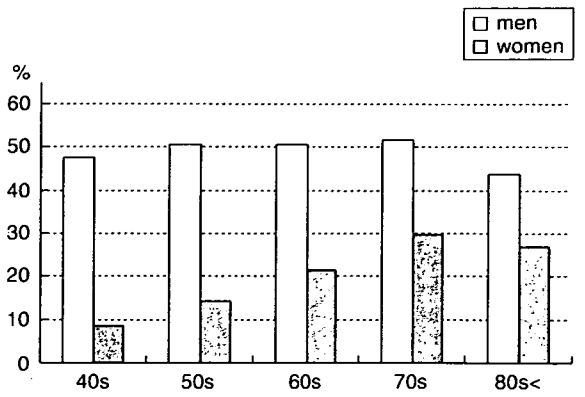

Fig 2. Prevalence of central obesity (waist circumference ≥85 cm in men; ≥90 cm in women) by age group in the studied population for each gender. The number of studied subjects was 7,329 men and 14,541 women. Age is shown as the median (1st, 3rd quartile). The survey was conducted from May 1, 2005 through to October 31, 2005. For men, p-values were not statistically significant. For women, p<0.0001 using the standard chi-square test. Men, age 68 (63–75); women, age 66 (60–72).

Table 3 Combinations of the Components for the Diagnosis of MS by Age Group

Combination	*40&45 years*	*Ratio*	*50s*	*Ratio*	*60s*	*Ratio*	*70s*	*Ratio*	*>80s*	*Ratio*	*Whole*	*Ratio*	*p value*
Men (n=1,348)													
No. by age group		*21*		*167*		*598*		*462*		*100*		*1,348*	
Dyslipidemia contributing to MS	*21*	*100%*	*142*	*85%*	*442*	*74%*	*351*	*76%*	*64*	*64%*	*1,020*	*76%*	*<0.0001*
Isolated high TG	*17*	*81%*	*107*	*64%*	*312*	*52%*	*223*	*48%*	*30*	*30%*	*689*	*51%*	*<0.0001*
Isolated low HDL-C	*2*	*10%*	*7*	*4%*	*45*	*8%*	*45*	*10%*	*20*	*20%*	*119*	*9%*	*0.001*
High BP contributing to MS	*21*	*100%*	*155*	*93%*	*561*	*94%*	*420*	*91%*	*94*	*94%*	*1,251*	*93%*	*<0.05*
Isolated high SBP	*8*	*38%*	*50*	*30%*	*266*	*44%*	*282*	*61%*	*76*	*76%*	*682*	*51%*	*<0.0001*
Isolated high DBP	*1*	*4.8%*	*18*	*11%*	*14*	*2.3%*	*7*	*1.5%*	*1*	*1.0%*	*41*	*3.0%*	*<0.0001*
High FPG contributing to MS	*4*	*19%*	*70*	*42%*	*324*	*54%*	*248*	*54%*	*63*	*63%*	*709*	*53%*	*<0.001*
Women (n=840)													
No. by age group	*9*		*96*		*322*		*305*		*108*		*840*		
Dyslipidemia contributing to MS	*7*	*78%*	*68*	*71%*	*219*	*68%*	*198*	*65%*	*79*	*73%*	*571*	*68%*	*NS*
Isolated high TG	*6*	*67%*	*63*	*66%*	*198*	*61%*	*173*	*57%*	*64*	*59%*	*504*	*60%*	*NS*
Isolated low HDL-C	*1*	*11%*	*3*	*3.1%*	*3*	*0.9%*	*12*	*3.9%*	*10*	*9.3%*	*29*	*3.5%*	*<0.001*
High BP contributing to MS	*8*	*89%*	*92*	*96%*	*307*	*95%*	*300*	*98%*	*96*	*89%*	*803*	*96%*	*<0.01*
Isolated high SBP	*2*	*22%*	*41*	*43%*	*168*	*52%*	*210*	*69%*	*71*	*66%*	*492*	*59%*	*<0.0001*
Isolated high DBP	*1*	*11%*	*7*	*7.3%*	*10*	*3.1%*	*7*	*2.3%*	*1*	*0.9%*	*26*	*3.1%*	*<0.05*
High FPG contributing to MS	*5*	*56%*	*48*	*50%*	*166*	*52%*	*154*	*50%*	*56*	*52%*	*429*	*51%*	*NS*

High TG, TG ≥1.7 mmol/L; low HDL, HDL-C <1.0 mmol/L; BP, blood pressure; high SBP, SBP ≥130 mmHg; high DBP, DBP ≥85 mmHg; high FPG, FPG ≥6.1 mmol/L. Other abbreviations see in Tables 1,2.

The frequency distribution of MS components between each gender was compared using the standard chi-square test.

various age groups. For men with MS, dyslipidemia was a greater contributing factor to MS in younger men than in older men; the opposite was true for high FPG. In women with MS, the contribution of dyslipidemia or high FPG to the diagnosis of MS did not differ with age.

Discussion

In the present study, we clarified the age and gender differences in the components contributing to the diagnosis of MS, according to the Japanese criteria, in the general Japanese population. We also analyzed the differences in clinical parameters in MS among each age group.

The main findings of the present study are: (1) The overall frequency of MS in the general population is 7,329 (18.4%) in men and 14,541 (5.8%) in women; (2) among the components of MS, high BP is the most frequent, followed by dyslipidemia, with high FPG being the least frequent, and isolated high DBP or low HDL-C being rare across the various age groups and genders.

The frequency of MS in men (18.4%) and women (5.8%) found in the present study is higher in that found in the study by Arai et al[13] This could be partly because the average age of subjects is much older in the present study than in their study. Indeed, in their study, most of the women satisfying the criteria were 50 years old or older. We compared several metabolic parameters between MS and non-MS subjects in each gender separately and found that serum UA levels, which is not a component in the criteria for MS, were significantly higher in MS than in non-MS subjects, in both men and women. Indeed, several studies suggest that UA is likely to be associated with insulin resis-

tance or risk factors of MS?[20–22]

Overall, the contributions of each component, such as dyslipidemia, high FPG and high BP, to the diagnosis of MS differ substantially. Our present finding that high BP was the most frequent component to the diagnosis of MS is consistent with a previous report on individuals who underwent regular medical checkups in Tokyo district, Japan,[14] although the average age of that study's subjects is younger compared with the present study.

In contrast to the high frequency of high BP contributing to the diagnosis of MS, that of isolated high DBP is quite low. This suggests that physicians need to pay attention to the prevention of high BP, especially from the viewpoint of high SBP. Whether or not the low prevalence of isolated high DBP is a favorable thing remains to be clarified. There is still some controversy about how to deal with high DBP?[23] It has been shown that in individuals with coronary heart disease, low DBP may be related to the development of atherosclerosis. Hence, some might argue that the low frequency of isolated high DBP is not a necessarily favorable thing.

The contribution of high FPG or dyslipidemia did not differ across age groups in women with MS. However, in men with MS, the contribution of high FPG to the diagnosis of MS was higher, and that of dyslipidemia was lower, in older men than in younger men. This finding suggests that in middle-aged men, more attention needs to be paid to the development of dyslipidemia, whereas in older men, the development of high FPG should be paid attention to. Overall, frequencies of isolated low HDL-C were found to be very low in both genders and across all age groups.

One of the limitations of the present study is that we do not have medication information among the study subjects for diabetes mellitus, hypertension or hyperlipidemia, which might affect some data to some degree. As a considerable number of subjects involved in the present study may take medications for treatment of these metabolic disorders, we presumably have underestimated the prevalence of MS in this population. On the other hand, the study's extremely large sample size is a strength and helps to confirm our findings.

In conclusion, the present data obtained from 21,870 Japanese individuals (7,329 men and 14,541 women), who underwent a routine medical checkup, indicates that physicians and other medical staff need to pay attention to age group and gender differences in the components contributing to the diagnosis of MS to properly prevent this metabolic disorder.

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