

Aging May Be The Major Determiner Factor of Excess Weight

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ABSTRACT

Background: As a major health problem, prevalence of excess weight is increasing in the world.

Methods: Consecutive patients at and above the age of 20 years were taken into the study to permit growth of height in youngsters.

Results: The study included 1068 cases (628 females) totally. Due to the small number of cases, 20 cases only, in the ninth decade, they were not included for statistical comparison. There were only 19 (1.7%) cases with underweight and 307 (28.7%) with normal weight, so 69.4% (742) of cases at and above the age of 20 years had excess weight. The prevalence of excess weight was 28.7% in the third but 63.6% in the fourth decades indicating a more than two-fold increase ($p < 0.001$). The prevalence continued to increase, and it was 78.4% in the fifth, 83.1% in the sixth, and 87.0% in the seventh decades. After the seventh decade, it started to decrease, and it was 78.5% in the eighth ($p < 0.05$) and 60.0% in the ninth decades of life.

Conclusion: Prevalence of excess weight is increasing by decades particularly in the fourth decade, and this increase turns to a decrease in the eighth decade. So 30th and 70th years of age may be breaking points for weight gaining, and aging may be the main determiner factor for excess weight. Probably decreased physical and mental stresses after the age of 30 years and debility and comorbid disorders induced restrictions after the age of 70 years may be the major causes for the changes.

Key words: Aging, excess weight.

Introduction

As a major health problem, prevalence of excess weight is increasing all over the world since it is a well known entity that excess weight causes a high cost on physical health even in early decades. The foremost physical consequences of excess weight are impaired glucose tolerance or type 2 diabetes mellitus (DM), dyslipidemia, white coat hypertension or hypertension (HT), and coronary heart disease (CHD)(1,2). Persons with excess weight have a higher prevalence of elevated blood pressure (BP) than lean persons, and well-known complications of HT are left ventricular

hypertrophy, CHD, heart failure, chronic renal failure, and stroke(3). Similarly, atherogenic dyslipidemia is commonly seen in cases with excess weight, and it is characterized by increased levels of triglycerides (TG) and/or low density lipoprotein cholesterol (LDL-C), or a decreased level of high density lipoprotein cholesterol (HDL-C) in serum(1). On the other hand, excess weight is accompanied by a large number of coagulation and fibrinolytic abnormalities suggesting that it induces a prothrombotic and proinflammatory state(4).

The slow-rate chronic inflammation is characterized

by lipid-induced injury that initiates invasion of macrophages followed by proliferation of smooth muscle cells, endothelial dysfunction, and increased atherogenicity(5-8). As a supporting evidence of the role of inflammation in atherosclerosis, elevations of serum C-reactive protein (CRP) carry predictive power for the development of major cardiovascular events(9,10). In particular, excess weight is considered as a strong factor for controlling of circulating CRP concentrations because adipose tissue is involved in the regulation of cytokines(11), so individuals with excess weight have elevated levels of CRP(12). Furthermore, excess weight is highly correlated with dietary intake of increased calories and fat, both of which have been linked to several types of cancer including breast, colon, and prostate(13,14). So excess weight is associated with an increased risk of all-cause mortality(15). We tried to understand any effect of aging on excess weight here.

Material and Methods

The study was performed in the Internal Medicine Polyclinic of the Dum lupinar University on routine check up patients between August 2006 and March 2007. Consecutive patients at and above the age of 20 years were taken into the study to permit growth of height in youngsters. Their medical histories including smoking habit, HT, DM, dyslipidemia, and already used medications were learnt, and a routine check up procedure including fasting plasma glucose (FPG), TG, HDL-C, LDL-C, and an electrocardiography was performed. Current daily smokers, at least for a period of last 12-month, and cases with a history of at least five pack-years smoked were accepted as smokers. Patients with devastating illnesses including type 1 DM, malignancies, acute or chronic renal failure, chronic liver diseases, hyper- or hypothyroidism, and heart failure were excluded to avoid their possible effects on weight. Body mass index (BMI) of each case was calculated by the measurements of the same physician in stead of verbal expressions. Weight in kilograms is divided by height in meters squared, and underweight is defined as a BMI of lower than 18.5, normal weight as 18.5-24.9, overweight as 25-29.9, and obesity as a BMI of 30.0 kg/m² or greater(1).

Cases with an overnight FPG level > 126 mg/dL on two occasions or already taking antidiabetic medications were defined as diabetics. An oral glucose tolerance test with 75-gram glucose was performed in cases with a FPG level between 100 and 126 mg/dL, and diagnosis of cases with a 2-hour plasma glucose level 200 mg/dL or higher is DM(1). Additionally patients with dyslipidemia were detected, and we used the National Cholesterol Education Program Expert Panel's recommendations for defining dyslipidemic subgroups(1). Dyslipidemia is diagnosed when LDL-C is 160 or higher and/or TG is 200 or higher and/or HDL-C is lower than 40 mg/dL. Office blood pressure was checked after a 5-minute of rest in seated position with a mercury sphygmomanometer on three visits, and no smoking was permitted during the previous 2-hour. A 10-day twice daily measurement of blood pressure at home (HBP) was obtained in all cases, even in normotensives in the office due to the risk of masked HT after a 10-minute educa-

tion about proper BP measurement techniques(16).

The education included recommendation of upper arm while discouraging wrist and finger devices, using a standard adult cuff with bladder sizes of 12 x 26 cm for arm circumferences up to 33 cm in length and a large adult cuff with bladder sizes of 12 x 40 cm for arm circumferences up to 50 cm in length, and taking a rest at least for a period of 5-minute in the seated position before measurement. An additional 24-hour ambulatory blood pressure monitoring (ABP) was not required due to an equal efficacy of the method with HBP measurement to diagnose HT(17). Eventually, HT is defined as a BP of 135/85 mmHg on HBP measurements(16). A stress electrocardiography was performed in suspected cases, and a coronary angiography was obtained only for the stress electrocardiography positive cases.

Eventually, patients with underweight, normal weight, overweight, and obesity were detected in each decade, and prevalences of them were compared between the decades. Student t-test was used as the method of statistical analysis.

Results

The study included 1068 cases (628 females and 440 males) totally. Due to the small number of cases, 20 cases only, in the ninth decade, this cases were not included for statistical comparison. There were only 19 (1.7%) cases with underweight and 307 (28.7%) with normal weight, so as a very high prevalence, 69.4% (742) of cases at and above the age of 20 years had excess weight. The prevalence of cases with normal weight was 64.6% in the third decade, and it decreased gradually but significantly until the seventh decade of life ($p < 0.05$ nearly in all steps), and then it started to increase again and reached up to 30.0% in the ninth decade again (Table 1).

Similarly, the prevalence of obesity was increased gradually but significantly and reached up to 43.7% in the sixth decade ($p < 0.05$ nearly in all steps), and then initiated to decrease again. In another word, prevalence of excess weight increased from 28.7% in the third to 87.0% in the seventh decade, and then decreased to 78.5% in the eight and 60.0% in the ninth decades of life. On the other hand, prevalences of HT, DM, and CHD continued to increase by aging without any break, whereas prevalence of dyslipidemia decreased in the eight decade parallel to the decreased prevalence of cases with excess weight significantly (Table 2).

Discussion

Recent studies have revealed that adipose tissue produces biologically active leptin, tumor necrosis factor-alpha, plasminogen activator inhibitor-1, and adiponectin, which are closely related to the development of complications(18,19), so it is important in medical terms to specify the excess weight not only as one of the risk factors, but as 'obesity disease'. For example, the cardiovascular field has recently shown great interest in the role of inflammation in the development of atherosclerosis and numerous recent epidemiological studies have indicated that inflammation plays an important role in the pathogenesis of atherosclerosis and thrombosis(6-8), and obesity is considered a strong factor for controlling of the circulating CRP concen-

Table 1: Characteristic features of the study cases

Variables	Third decade		Fourth decade		Fifth decade		Sixth decade		Seventh decade		Eight decade		Nineth decade
Number	181		157		246		249		108		107		20
Prevalence of smoking	11.0% (20)	*	32.4% (51)		28.8% (71)		31.7% (79)		23.1% (25)		23.3% (25)		15.0% (3)
Prevalence of underweight	6.6% (12)	†	1.9% (3)		0.4% (1)		0.0% (0)		0.0% (0)		0.9% (1)		10.0% (2)
Prevalence of normal weight	64.6% (117)	*	34.3% (54)	*	21.1% (52)		16.8% (43)		12.9% (14)	†	20.5% (22)		30.0% (6)
Prevalence of overweight	24.3% (44)	*	42.0% (66)		45.9% (113)	†	39.3% (98)		46.2% (50)		40.1% (43)		25.0% (5)
Prevalence of obesity	4.4% (8)	*	21.6% (34)	*	32.5% (80)	*	43.7% (109)		40.7% (44)		38.3% (41)		35.0% (7)

*p<0.001 †p<0.05

Table 2: Associated diseases of the study cases

Variables	Third decade	Fourth decade	Fifth decade	Sixth decade	Seventh decade	Eight decade	Nineth decade
Prevalence of hypertension	0.0%	5.0%	10.4%	20.4%	31.4%	38.3%	40.0%
Prevalence of diabetes mellitus	0.5%	1.9%	11.7%	21.6%	25.0%	26.1%	10.0%
Prevalence of dyslipidemia	6.6%	26.7%	31.7%	38.9%	39.8%	20.5%	35.0%
Prevalence of coronary heart disease	0.0%	0.0%	3.6%	12.8%	22.2%	24.2%	35.0%

trations because adipose tissue is involved in the regulation of cytokines(11). On the other hand, individuals with excess weight will have an increased circulating blood volume as well as an increased volume of cardiac output, thought to be the result of increased oxygen demand of the extra body tissue. The prolonged increase in circulating blood volume can lead to myocardial hypertrophy and decreased compliance, in addition to the common comorbidity of HT.

The relationship between the excess weight and HT is also described under the heading of the metabolic syndrome. In addition to the HT, the prevalences of high FPG, high serum total cholesterol, and low HDL-C, and their clustering were all raised with increases in BMI(20). Combination of these cardiovascular risk factors will eventually lead to an increase in left ventricular stroke work with a higher risk of arrhythmias, cardiac failure, or even sudden cardiac death. So the above prospective cohort study showed that the BMI is one of the independent risk factors for stroke and CHD (20). Similarly, the incidences of CHD and stroke, especially ischemic stroke, have increased with an elevated BMI in other studies(21). Eventually, the risk of death from all causes including cardiovascular diseases and cancers increases throughout the range of moderate and severe excess weight both for men and women in all age groups(22).

Similarly, the prevalences HT, DM, and CHD increased gradually and significantly from the third towards ninth decades of life here (p<0.05 nearly in all steps), but interestingly and parallel to the decreased prevalence of excess weight in the eight decade, the prevalence of dyslipidemia decreased after the seventh decade, and it decreased from 39.8% to 20.5% in the eight decade of life (p<0.001), which may indicate a direct relationship between the dyslipidemia and weight excess.

Although the all-known consequences of excess weight on health, its prevalence is increasing in the world with unknown reasons. We saw in this study that the prevalence of excess weight was 28.7% in the third but was 63.6% in the fourth decades indicating a more than two-fold increase in prevalence (p<0.001). The prevalence continued to increase, and it was 78.4% in the fifth, 83.1% in the sixth, and 87.0% in the seventh decades. After the seventh decade, it started to decrease, and it was 78.5% in the eight (p<0.05) and 60.0% in the ninth decades of life. So 30 and 70 years of age were the breaking points of life for weight gaining. So aging may be the main determiner factor for excess weight. Probably decreased physical and mental stresses after the age of 30 years and debility and comorbid disorders induced restrictions on diet after the age of 70 years may be the major causes for the changes of body weight at these ages.

As a conclusion, although the already known consequences of excess weight on health, nearly three-fourths of cases above the age of 30 years have excess weight, and the prevalence of excess weight is increasing by decades particularly in the fourth decade, and this increase turns to a decrease from the eight decade of life. So 30th and 70th years of age may be the breaking points of life for weight gaining, and aging may be the main determiner factor for excess weight. Probably decreased physical and mental stresses after the age of 30 years and debility and comorbid disorders induced restrictions after the age of 70 years may be the major causes for the changes of body weight at these ages.

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