The reference values of apolipoprotein B related with age and sex

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In this study, the serum apolipoprotein (Apo) B concentrations were analysed in 344 healthy people considering the changes in age and sex. Ages were grouped as 20-29, 30-39, 40-49, 50-59, 60-69. Concentration ranges for apo B were 50-134 mg/dl, 48-128 mg/dl and 54-138 mg/dl for the total population, the women and the men, respectively. Concentrations were significantly higher (p<0.001) in men (96±21 mg/dl) than in women (88±20 mg/dl). Serum apo B levels showed increase with age in men and women. The lowest values were seen in the 20-29 age group in both sexes. THese findings suggest that not only sex but also age of the subjects effect serum apo B levels. [Turk J Med Res 1995, 13(4):151-153]

Key Words: Apolipoprotein B, Sex, Aging

Atherosclerotic risk can be assessed in terms of plasma lipid, apolipoprotein concentration changes (1,2). The protein moieties of plasma lipoproteins have been the focus of more interest, because the entire spectrum of lipoprotein metabolism is regulated by the apolipoproteins (3). The concentration of plasma apolipoprotein (apo) A, and B are considered to be good indicators of atherosclerotic risk in humans (4). There are two major forms of apo B, designated as B-48 and B-100 (the most abundant form); which are synthesized by the intestine and liver respectively (5). Apo B-48 is the major structural protein for chylomicrons while apo B-100 is for very low density lipoprotein (VLDL) and low density lipoprotein (LDL) and both these apolipoproteins have been implicated in atherogenesis (6). As a structural component of LDL, apo B-100 interacts with the LDL receptors of peripheral cells (4). Thus, apoB (apo B-100) plays an important functional role in recognition of cellular receptors for the catabolism of LDL (4,5). Plasma concentration of lipids and apolipoproteins are dependent on endogenous and/or exogenous factors, e.g. sex, age, nutrition, body weight (7-9). Thus, determination of reference values for apolipoproteins in healthy subjects are needed. Our previous results showed that serum apo-A was influenced by age and sex (9).

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We report here our determination of reference interval for serum apo-B in healthy subjects and the influence of sex and age on this value.

MATERIALS AND METHODS

Apo B was measured in serum of 374 healthy people (F/M:178/196) with age ranging between 20-69 years. The subjects had no obesity, no drug treatmen (e.g. oral contraceptives, etanol abuse, corticosteroides, catecholamines), and they had not other factors that change apo B levels like diabetes mellitus, or hypertension. Subjects maintained thair usual diets and lifestyles without any physical activity restrictions. We divided the subjects into five groups according to age: 20-39 years, 40-49 years, 50-59 years, 60-69 years (Table 1).

Peripheral venous blood samples were obtained in the fasting state at 12 hours. Serum specimens were stored frozen at -30 C for no longer than one month. Serum apo B were measured by Orion Diagnostica Imunochemical method. The method is based on measurement of immunoprecipitation at 340 nm. The results correlate well with those from immunodiffusion (RID) with a coefficent of below 5% (10).

Students t test was used for the statistical interpretation of the data. Means, standart deviations were calculated for the whole population as well as for males and females separately.

RESULTS

The age and sex distribution of apo B levels of 178 women and 196 men is shown in Table 1.

Table **1.** Serum Apo B levels in healthy subjects

Age groups	Women n	Men n	Apo B Women	Apo B Men
20-29	46	31	80±21	87±20
30-39	25	33	84±17	95+16*
40-49	31	51	87±21	98±26"
50-59	59	56	94±21	101±18
60-69	17	25	95±22	101±24
Total women and men	178	196	88±20	96+21"
Total subjects	374		92±21	

*:p<0.05 significantly elevated from levels found in women
":p<0.001 significantly elevated from levels found in women

Table **2.** Apo B values from normal population

Reference	n	of cases	Age (yr)	Mean values or concentration ranges for Apo B (mg/dl)
Wald et al (14)	1145	(M)	53	51-131
Chu et al (15)	21	(F+M)	45-75	61-137
Brown et al (16)	44	(F)	18-35	58
Lowe et al (17)	548	(M)	16-66	41-128
	136	(F)	17-66	36-118
Cavancanti et al (18)	101	(F+M)	45<	50-206
Zunic et al (19)	448	(F+M)	18-61	60-194
	265	(M)		63-201
	183	(F)		54-191
This study	374	(F+M)	20-69	50-134
	196	(M)		54-138
	178	(F)		48-128

The mean apo B levels of men were significantly greater than that of women ($p<0.001$) and the reference interval (mean±2SD) for apo B in the women population was 48-128 mg/dl and in the men population was 54-138 mg/dl. Concentration ranges for apo B of general population was 50-134 mg/dl.

Serum concentrations of apo B increased with age (Figure 1). This elevation were significantly different in 50-59 ages ($p<0.001$), 60-69 ages ($p<0.001$) from 20-29 ages; and 50-59 ages ($p<0.05$) from 30-39 ages in women; 40-49 ages ($p<0.05$), 50-59 ages ($p<0.005$) 60-69 ages ($p<0.05$) from 20-29 ages in men.

DISCUSSION

Apo B is the major protein component of VLDL and LDL in serum (5). Clinical studies suggest that serum apolipoproteins are more strongly related to the risk of cardiovascular disease than cholesterol fractions of lipoproteins (3,11). It has ben reported that serum apo B level was predictive (12,13) and had the strongest association with ischaemic heart disease (IHD) risk; a decrease in apo B of 10% was associated with 22% lower risk of IHD (14). Furthermore, Wilcken et al (12) suggested that there were significant associations between increased Lp(a) and apo B levels in children and numbers of grandparents with coronary vascular events and with increasing coronary history scores in

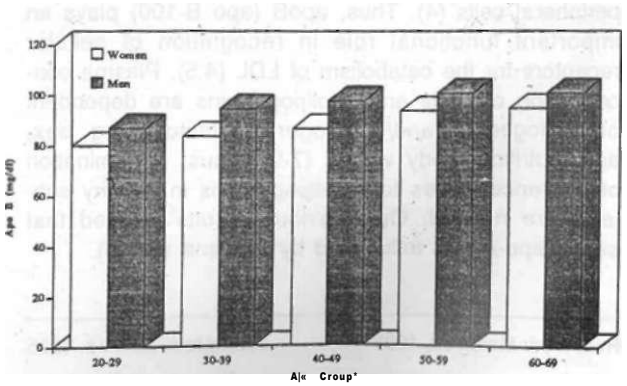

Figure **1.** Serum apo B concentration alterations with age in women and men.

grandparents. Measurement of LP(a) and apo B in schoolchildren my help to identify children and their farnilies having increased risk.

Our results showed that serum apo B was significantly higher in healthy men than in women. This increment was clear in 30-39 and 40-49 age groups. Apo B values in some other studies and this study from normal population with immunochemistry system are summarized in Table 2. Differences between these results can be partly attributed to the methods of measurement and differences of populations (15-18).

Zunic et al (19) reported that apo B concentration were significantly higher in men than in women. They observed higher increasesd in apo B levels with age when compared to different our results. There results may be attributed to the lipid compositions of the diets and/or absorbtive status of subjects during blood sampling (1,16).

Our results indicate that the concentration of plasma apo B is influenced by both sex and age. Higher concentration of apo B in men than women may be reflect partly greater atherosclerotic risk in men. We recommend that each laboratory should determine its own normal apo B range.

Yaş ve cinsiyetle ilişkili apolipoprotein B'nin referans değerleri

Bu çalışmada 344 sağlıklı kişide apolipoprotein (apo) B konsantrasyonu ölçüldü, yaş ve cinsiyete göre değişimi incelendi. Yaşlar 20-29, 30-39, 40-49, 50-59, 60-69 olarak grup/andırıldı. Total popülasyon, kadın ve erkekte ApoB'nin konsantrasyon aralığı sırasıyla 50-134 mgjdl, 48-134 mg/dl, 48-128 mg/dl ve 54-138 mg/dl olarak tespit edildi. Erkeklerdeki (96±21 mg/dl) kadınlardakinden (88±20 mg/dl) önemli olarak yüksektir (p<0.001). Serum apo B seviyeleri kadın ve erkeklerde yaşa bağımlı olarak artma gösterdi. En yüksek seviyeler her iki cinste de 20-29 yaş gruplarında görüldü. Bu bulgular serum apo B seviyelerinin yaş ve cinsiyetten etkilendiğini göstermektedir.
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