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Pulse pressure and apolipoprotein B/Apolipoprotein A1 in relation to the metabolic syndrome and its components.

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BACKGROUND

The metabolic syndrome is a series of synergistically interacting risk factors for CVD, many or all of which may share a common etiology, at least in a substantial proportion of patients. Delineation of the including heterogeneity of etiology would be useful in refining prevention and treatment strategy .

OBJECTIVES

Some researches have demonstrated that apolipoprotein B/Apolipoprotein A1 ratio (Apo B/Apo A1) and pulse pressure (PP) are associated with MS.

Objectives of this study are to evaluate the influence of the metabolic syndrome and its components on PP and apolipoprotein B/Apolipoprotein A1 ratio.

MATERIALS AND METHODS

A total of 107 persons without any apparent disease were selected with mean age of 45.6 years. The number of women was 64 and the number of men was 43. Systolic (SBP) blood pressure, diastolic (DBP) blood pressure and waist circumference (WC) were measured.

Pulse pressure (PP) was determined by the formula.

The biomarkers: HDL – cholesterol, serum triglycerides and blood glucose

Metabolic syndrome was diagnosed in 36 persons (34%) in accordance with NCEP-ATP III definition.

STATISTICS

One way ANOVA test was performed on the pulse pressure by splitting the participants into four groups:

1) men with MS
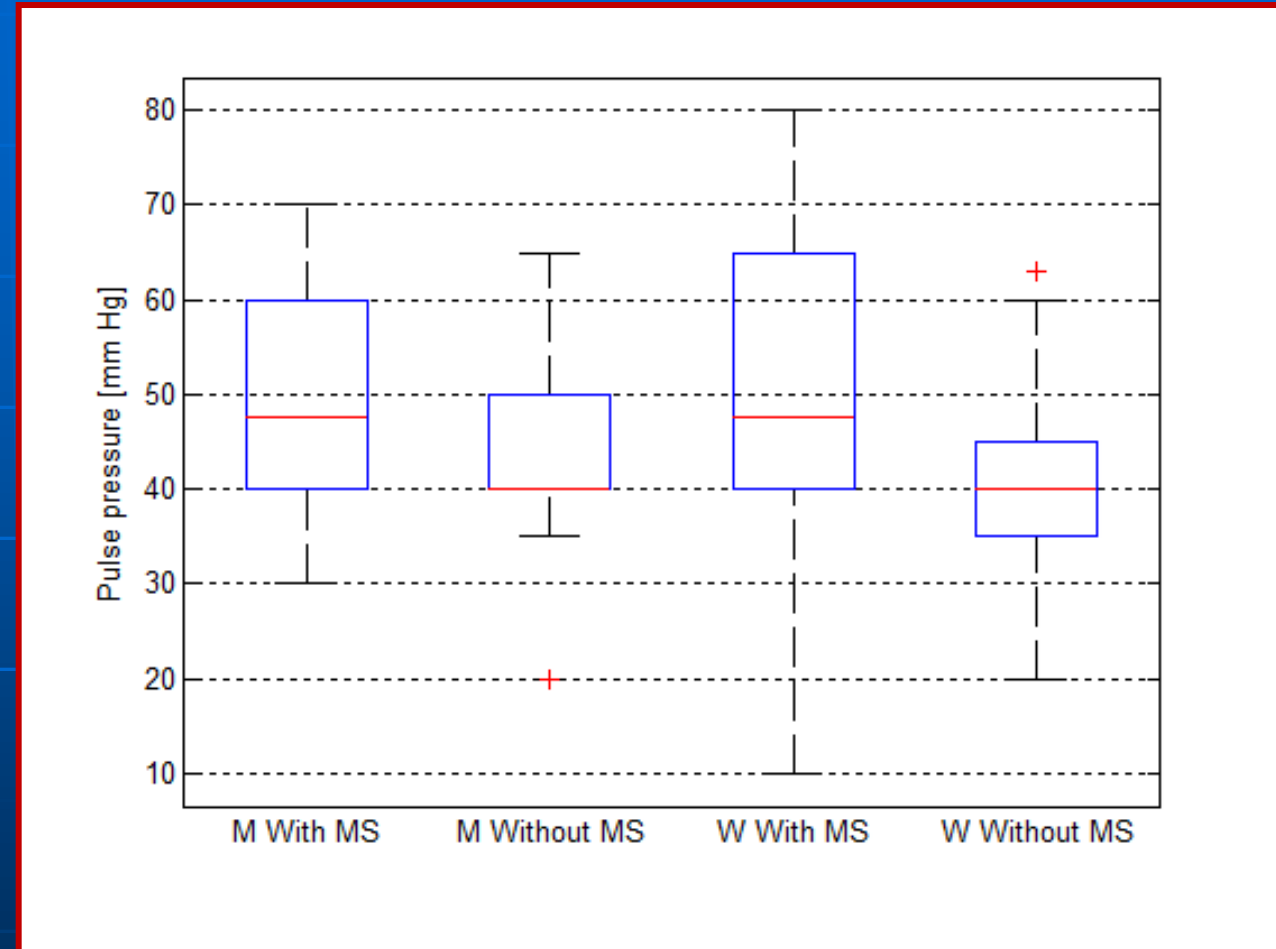2) men without MS
3) women with MS
4) women without MS.

Multiple comparison test of means was used to obtain the differences between every two groups. Multiple logistic regression analysis was implemented to estimate OR of MS.

The box plots for one way ANOVA test of pulse pressure (Figure 1) showed that the difference between persons with and without MS is more significant for women.

The ANOVA F-statistic was 3.683 with p-value 0.0145 and the hypothesis that the all groups' means were equal had to be rejected.

M – men; W – women; MS - metabolic syndrome

Figure 1: Box plots for one way ANOVA test of pulse pressure for groups: Men with MS, Men without MS, Women with MS and Women without MS

The multiple comparison tests indicated statistically significant difference in the PP mean values between groups of women with and without MS (Table 1).

A considerable difference in means between groups of men without MS and women without MS was obtained (Table 1).

Some difference in means was observed between groups of men with and without MS (Table 1).

The difference in means between groups of men with MS and women with MS was very small (Table 1).

First group	Second group	Lower boundary of the CI	Difference between means	Upper boundary of the CI
Men with MS	Men without MS	-6.3028	4.0099	14.323
Men with MS	Women with MS	-10.866	-0.0325	10.801
Men without MS	Women without MS	-2.5654	5.0854	12.736
Women with MS	Women without MS	0.78792	9.1277	17.467

Table 1. Table of multiple comparison test for men and women with and without MS.
MS - metabolic syndrome; CI – 95% confidence interval

Multiple logistic regressions were used to determine odds ratio of MS. First a model with APO B/APO A1 ratio and PP as predictor variables, adjusted for gender was studied.

The relation between OR and predictor variables, according to obtained model, indicated increasing of OR when the values of APO B/APO A1 ratio and PP were greater (Figure 2, Figure 3).
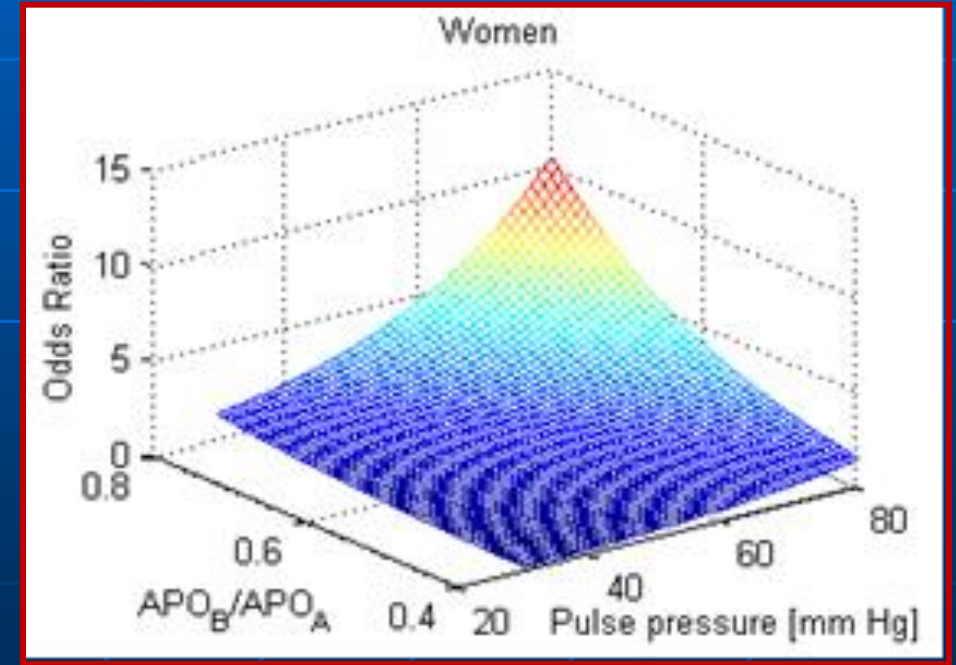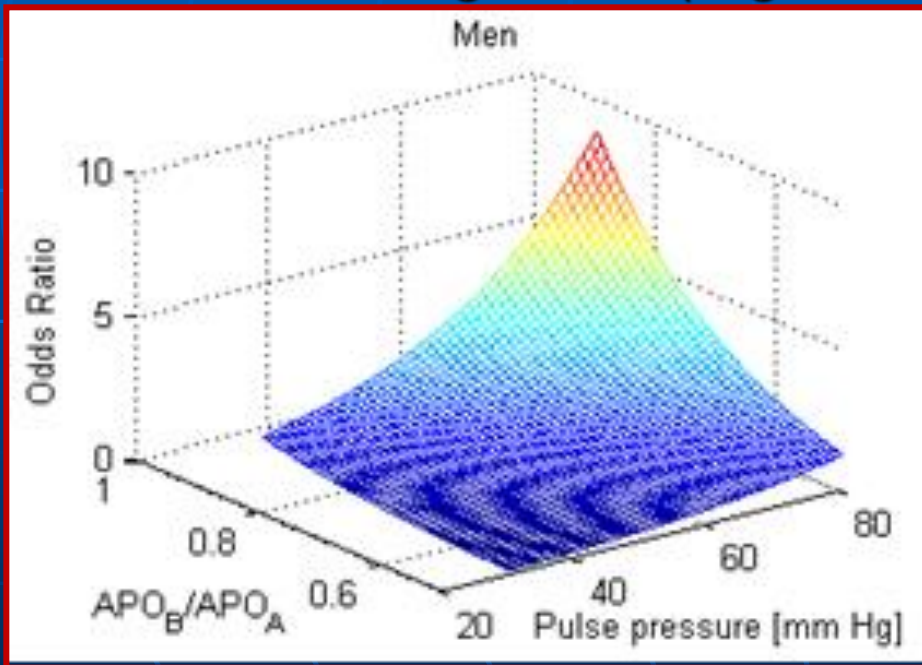

Figure 2: Odds ratio as function of APO B/APO A1 ratio and PP, according to the first model.

The results showed differences between men and women.

The p-value for overall model fit statistic was 4.68×10^{-5}.

The p-values for regression coefficient of APO B/APO A1 ratio were 0.0019 and 0.0412 for regression coefficient of PP.

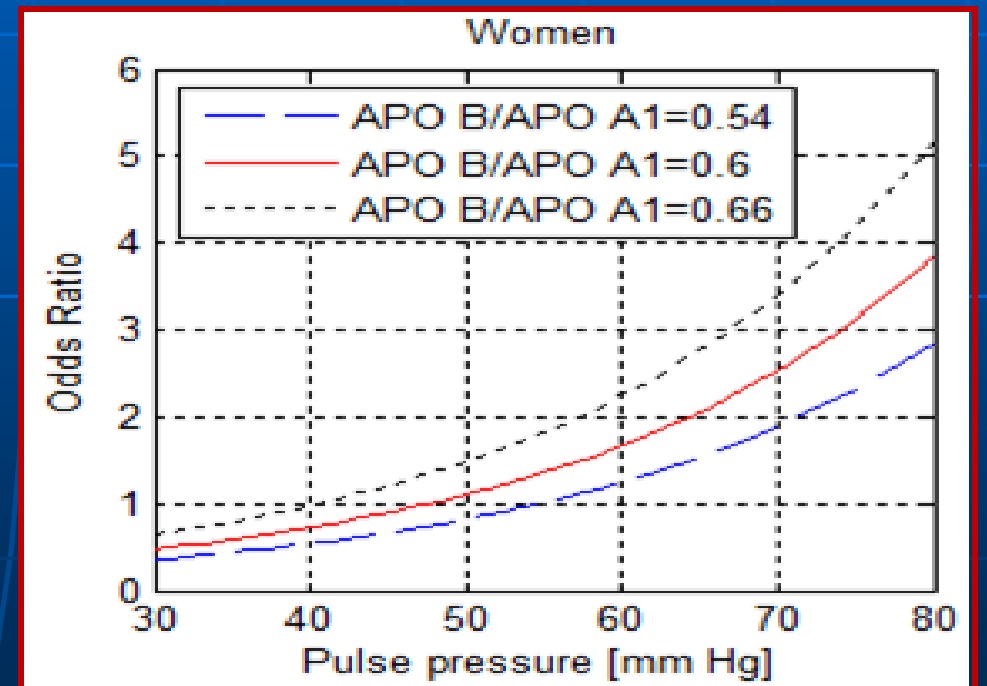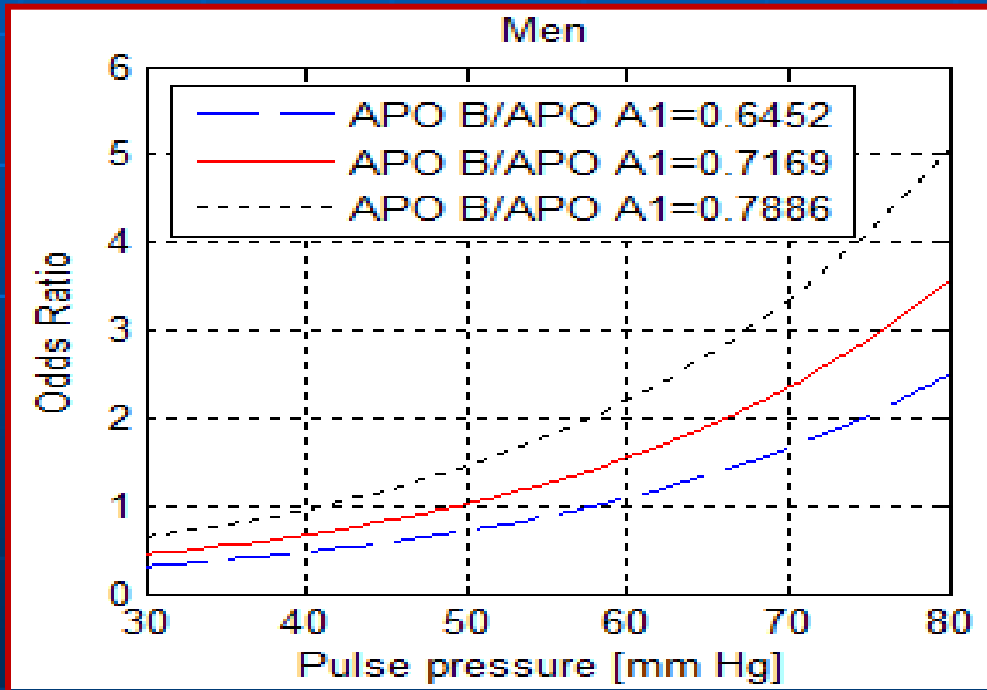These p-values showed that predictor variables contribute significantly to the odds ratio of MS.

Figure 3: Odds ratio as function of PP, according to the first model.

RESULTS: MODEL 1

The results indicated that the increasing of OR with increasing of PP for men was similar to that for women when the men's APO B/APO A1 ratio was with about 0.1 greater (Figure 3).

The obtained model showed that for increase of PP with 5 mm Hg it was expected about 1.2314 times increase in the odds ratio of MS and for increase of APO B/APO A1 ratio with 0.1 it was expected about 1.6363 times increase in the odds ratio.

MODEL 2: WC, HDL-CHOL, GLU, TG

In the second model-- in addition to PP-- four dichotomous variables were included and the model was adjusted for gender.

The dichotomous variables were composed using the following components of MS: waist (WC), HDL cholesterol, blood glucose (Glu) and serum triglycerides (Tg).

Each dichotomous variable received value 1 if the criterion for corresponding component in NCEP-ATP III definition was met.

The p-value for overall model fit statistic was less than 1×10^{-6}.

The p-values of regression coefficients were 0.0001 for WC>102/88 cm (men/women), 0.0302 for HDL<1.03/1.3 mmol/l (men/women), 0.0097 for Glu>6 mmol/l and 0.0002 for Tg>1.7 mmol/l.

The p-value of regression coefficient for PP was 0.0061.

These p-values showed that all model variables contribute significantly to the odds ratio of MS.

This model was used to study the relation between the odds ratio of MS and the value of pulse pressure when only one of the other MS components met criterion (Figure 4)

The results demonstrated when only HDL-cholesterol or blood glucose met criterion the odds ratio was less than 1 even for PP up to 80 mm Hg (Figure 4).
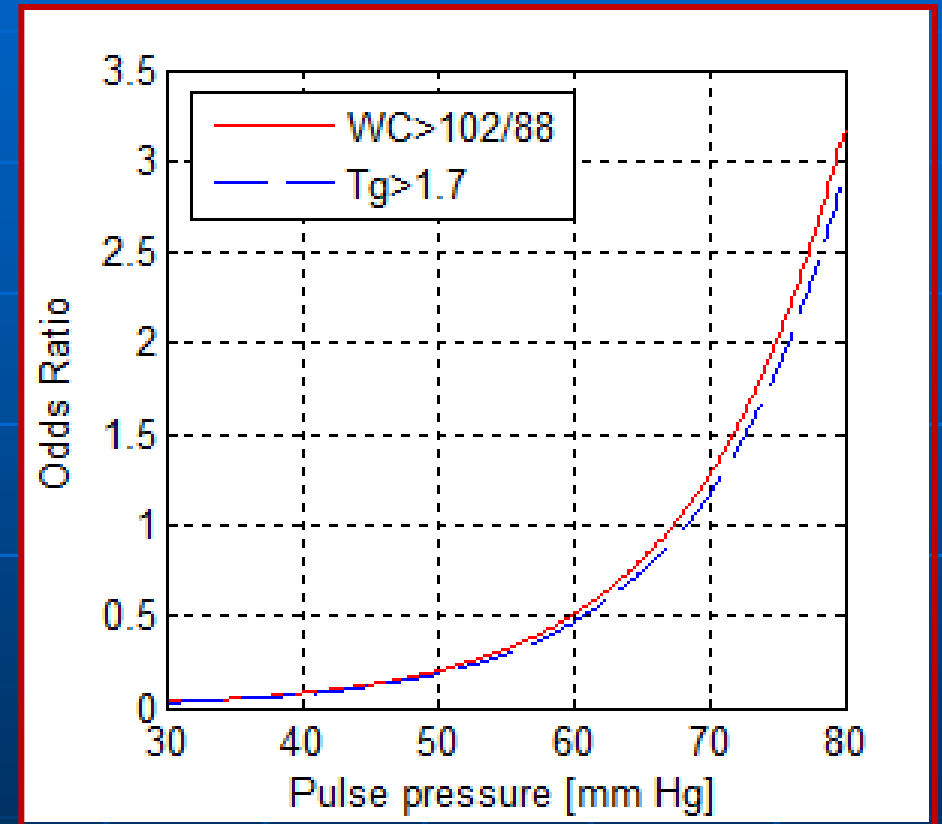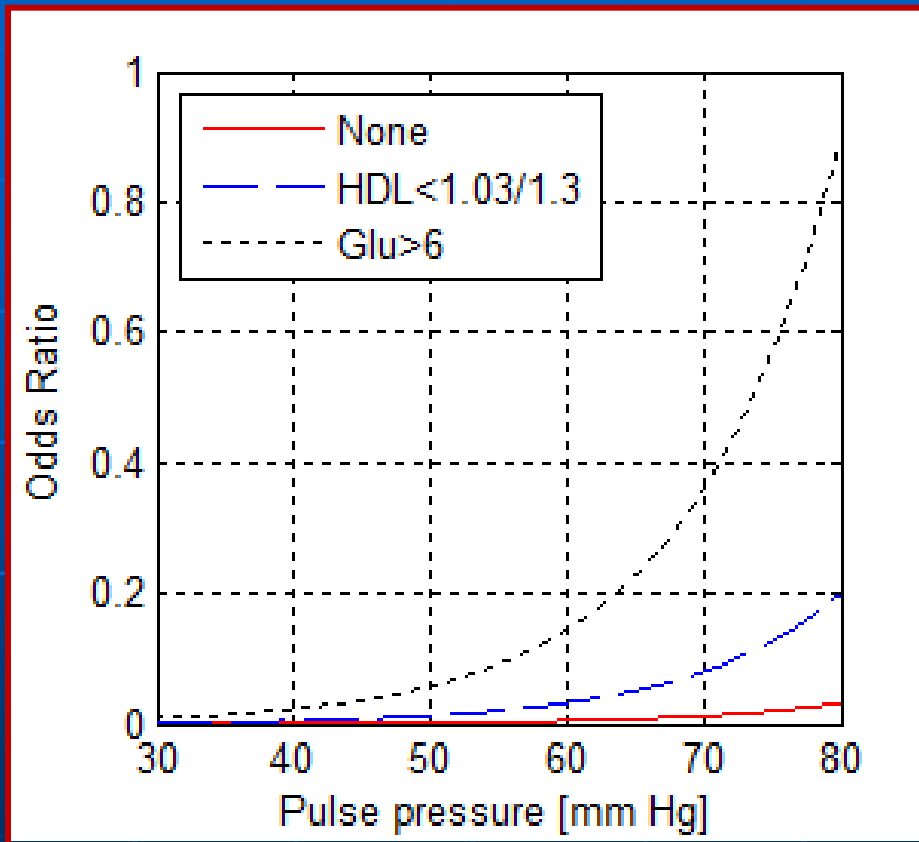

Figure 4: Odds ratio as function of PP when only one of the MS components was met criterion.

When waist or triglycerides met criterion the odds ratio was more than 1 for wide PP. The models for waist and triglycerides were very similar.

The obtained model showed that for increase of PP with 5 mm Hg it was expected about 1.5787 times increase in the odds ratio of MS.

MODEL 2: RESULTS

In the second model in addition to PP four dichotomous variables were included and the model was adjusted for gender. The dichotomous variables were composed using the following components of MS – waist (WC), HDL cholesterol, blood glucose (Glu) and serum triglycerides (Tg).

CONCLUSION

The results showed that the pulse pressure was more significant factor that contributes to metabolic syndrome for women than for men. The obtained mean of pulse pressure was considerable wider for women without MS than for men without MS.

The researches indicated that simultaneously increasing in PP and APO B/APO A1 ratio had cumulative effect on odds ratio of MS. This effect is more significant to women. The results showed that PP and APO B/APO A1 ratio could be used as complex marker for metabolic syndrome.

CONCLUSION CONT'D

When the pulse pressure was wide and waist was greater than 102/88 cm (men/women) the odds ratio was above 1-- these two factors could be used to diagnose metabolic syndrome.

The same conclusion could be made for wide pulse pressure and triglycerides level grater than 1.7 mmol/l.

The results showed that PP and waist or triglycerides level could be used as indicator of metabolic syndrome.

FINAL REMARK

It could be said that wide pulse pressure together with some of the considered clinical and biochemical markers could be used to diagnose metabolic syndrome.

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