• Poster Presentation •

Research on Influence Factors on Pulmonary Functions in Korean-Chinese Children

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Abstract

To identify the difference between Korean-Chinese and Korean children's variation of pulmonary function with personal factors (suck as age, height, and weight), we performed pulmonary function test (PFT) and measured personal factors of 200 Korean-Chinese children participants from two elementary schools of Beijing and Helong city in China.

Regression analysis was utilized to determine which personal factors were significantly correlated with PFT measure (FVC and FEV_1). We compared the regression model from this study with those of other studies of Korean children.

Similar to other studies, we found that the most important variable, influencing PFT measure, was height, whereas addition of either age or weight in the regression virtually did not increase the accuracy. As the result of comparison of the regression model from this study with those of other studies of Korean children, variation in FVC or FEV_1 with height were similar.

Introduction

The project "Research on Health Risk Assessment of Environment Pollution" was agreed in the 7^{th} Environmental Meeting between Chinese and Korean governments on March 22, 2001.

As the preliminary study of the 1^{st} year's working, pulmonary function and it's related factors were investigated on 200 Korean-Chinese children living in a Beijing (urban area) and Helong (rural area) in China.

The proportion of variation in FVC or FEV_1 attributable to personal factors (such as age, height, and weight) is up to 30% [1], and most of studies compared pulmonary function between groups after adjustment for these factors.

In this study, we performed regression analysis to determine which personal factors were significantly correlated with PFT measure, and we compared the regression model from this study with those of other studies of Korean children, to identify the difference between Korean-Chinese and Korean children.

Materials and Method

200 school children, grade 3 to 6, from two schools on China (one school is located in urban area: 26 boys, 39 girls, and the other school is located in rural area: 71 boys, 64 girls) were recruited to perform the pulmonary function test (PFT). A questionnaire concerning medical history and potential confounders (such as passive smoking, heating source, cooking source, family income, presence of pets, and crowding within a room) was filled out by children's parents.

PFT was performed according to the American Thoracic Society (ATS) criteria to ensure quality [2]. The curve with the largest forced vital capacity (FVC) and forced expiratory volume in one second (FEV_1) was chosen as the "best" curves, according to the ATS criteria.

FVC and FEV_1 were regressed against the independent variables of age, height, and weight. The form of the model and choice of independent variables were based on a combination of statistical significance, fraction of explained variability (R^2), and other considerations related to simplicity and compatibility with methods used by other investigators.

Multiple regression was utilized to determine which potential confounders (such as area, passive smoking, heating source, cooking source, family income, presence of pets, and crowding within a room) were significantly correlated with FVC or FEV_1.

Results and Discussion

One-variable model :

The results of regression analysis between height and PFT measure (FVC or FEV_1) were statistically significant. A considerable amount of variation is accounted for by height with an R^2 of 0.699 for FVC, 0.687 for FEV_1 in boys, and 0.670 for FVC, 0.659 for FEV_1 in girls.

- boys :
  - $FVC = -3.384 + [\ 0.04054 \times Height(cm)\ ]$
  - $FEV1 = -2.767 + [\ 0.03427 \times Height(cm)\ ]$
- girls :
  - $FVC = -3.743 + [\ 0.04193 \times Height(cm)\ ]$
  - $FEV1 = -3.256 + [\ 0.03718 \times Height(cm)\ ]$

For both boys and girls, age was associated with increased FVC and FEV_1, but statistically insignificant.

Compared with regression model with height as independent variable, explained variance (R^2 value) was decreased in regression model with weight.

Multi-variable model :

The correlation between height and PFT measure was highest as the results of analysis on one-variable regression model. Then we chose regression model with height as independent variable as base model, and performed analysis on multi-variable model which including age or weight as well as height.

Including expression of age in the regression did not increase the explained variance (R^2), and p-values of age were more than 0.05 in both boys and girls.

Height and weight were similar in terms of improving R^2, with little improvement when both are used in the model, height being chosen as the preferred measure. Also p-values of weight were more than 0.05 in boys.

Potential Confounders :

The results of regression analysis between potential confounders (such as area, passive smoking, heating source, cooking source, family income, presence of pets, and crowding within a room) and PFT measure (FVC or FEV_1) were not statistically significant.

Comparison with Previous Studies :

We compared the regression model from this study with those of other studies of Korean children.

- Yoon et al, 1993, [3] :

Boys :	FVC	=	-4.088 + [0.046 × Height(cm)]
	FEV1	=	-3.277 + [0.037 × Height(cm)]
Girls :	FVC	=	-3.696 + [0.0423 × Height(cm)]
	FEV1	=	-2.666 + [0.0319 × Height(cm)]

- Choi et al, 1995, [4] :

Boys :	FVC	=	-3.853 + [0.044 × Height(cm)]
	FEV1	=	-3.056 + [0.036 × Height(cm)]
Girls :	FVC	=	-3.556 + [0.040 × Height(cm)]
	FEV1	=	-3.210 + [0.037 × Height(cm)]

Although the slop of variable (change in pulmonary function values with height) in boys is generally lower than those from studies, but these differences were small. For girls, the slop of variable from the present study appear to be similar or slightly higher than those from other studies. These result is thought by ethnic background is same between Korean-Chinese and Korean children.

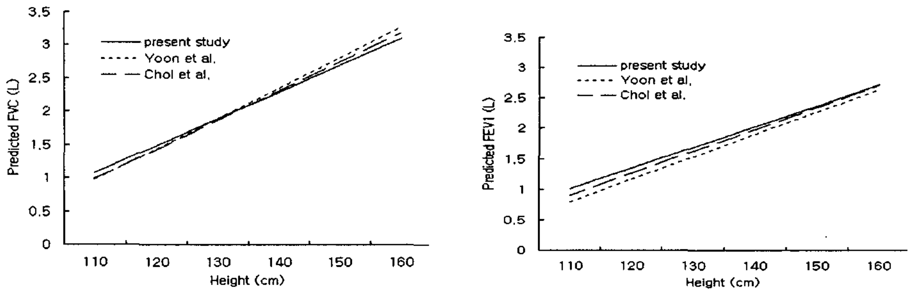

Fig. 1. Comparison of predicted FVC and FEV1 by height in boys among three studies

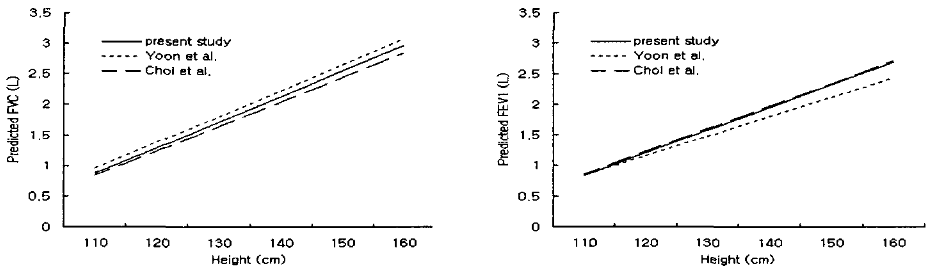

Fig. 2. Comparison of predicted FVC and FEV1 by height in girls among three studies

Conclusion

Similar to other studies, we found that the most important variable, influencing PFT measure, was height, whereas addition of either age or weight in the regression virtually did not increase the accuracy.

As the result of comparison of the regression model from this study with those of other studies of Korean children, variation in FVC or FEV1 with height were similar.

References

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