Short Communication

A comparative study of vital capacity of Indian and Nepalese young female

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Vital capacity is an important index in pulmonary function. At present, it is difficult to achieve accuracy in clinical diagnosis because of lack of unified standard of the normal reference value in younger women's vital capacity in Nepal. So, the present study was carried out to evaluate vital capacity of healthy Nepalese young females and compare their values with healthy Indian counterparts to know whether Indian prediction equations for vital capacity can be used for Nepalese population or not. Ninety six (42 were Indians and 54 were Nepalese) young, non-smoker, female students of 18 to 20 years of age were recruited for this study. The mean vital capacity of Nepalese and Indian girls were 2650.31 ± 464.34 and 2629.21 ± 449.97 ml respectively. As no significant difference was found in the mean vital capacity of Nepalese and Indian female students, prediction equation made for Indian females may be used for Nepalese subjects. Therefore, an attempt has been made to formulate a regression equation from the combined Indian and Nepalese subjects. A stepwise, multiple, linear, regression equation was performed for this purpose. The regression equation based on height for the combined Indian and Nepalese adult females is calculated as: Vital capacity (ml) = 26.2 × Height (cm) – 1467.21.

Key words: Vital capacity, spirometry, Nepalese female, regression equation.

INTRODUCTION

Pulmonary function testing, measures the function of lung capacity and lung and chest wall mechanics to determine whether or not the patient has a lung problem. However, the required instruments are relatively expensive. Vital capacity is an important index in pulmonary function. At present it is difficult to achieve accuracy in clinical diagnosis because of lack of unified standard of the normal reference value in younger women's vital capacity in Nepal.

Many studies on vital capacity in the general population have been carried out previously in India (Chhabra, 2009) and abroad (Singh et al., 1993; González-Camarena et al., 1993). No such study of normal Nepalese children and young adults was found. It is not possible to establish a national vital capacity norm in a country for healthy men and women as lung function varies with socio-economic (Raju et al., 2005), geographical, environmental (Virani et al., 2001) and nutritional conditions (Zverev and Gondwe, 2001). Nepal is a neighboring country of India and the socio-economic, geographical, environmental and nutritional conditions of the people are quite similar with respect to India. So, an attempt has been made to evaluate vital capacity of healthy Nepalese young females and compare their values with healthy Indian counterparts to know whether Indian prediction equations for vital capacity can be used for Nepalese population or not.

MATERIALS AND METHODS

The present study is a cross-sectional study carried out on 96 non-smoking, healthy female students of 18 to 20 years of age studying at the Nepalgunj Medical College in Chisapani, Banke, Nepal. Students of basic sciences (1st to 4th semester) during the year 2008 to 2009 participated in the present study. Among them, 42

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Table1. Comparisons of physical characteristics including vital capacity of the Indian and Nepalese young females.

Variables	Indian (Value ± SD)	Nepali (Value ± SD)	Level of significance
Age (years)	18.96 ±1.01	19.30 ± 0.79	NS
Height (cm)	157.73 ± 5.97	156.08 ± 5.46	NS
Weight (kg)	54.33 ±7.03	51.54 ± 7.04	NS
BSA (m^2)	1.54 ± 0.11	1.50 ± 0.10	NS
Vital capacity (ml)	2629.21 ± 449.97	2650.31 ± 464.34	NS
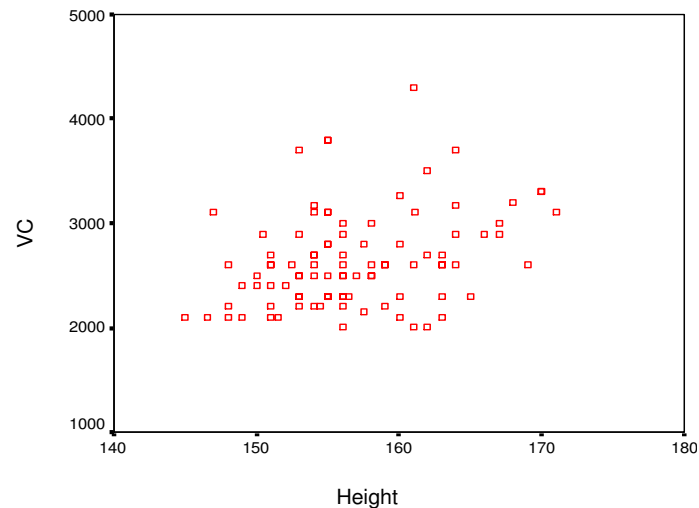
Figure 1. Linear regression analysis depicting the prediction of vital capacity (VC) from height of the Nepalese and Indian young females.

were Indians and 54 were Nepalese by birth. A Detailed medical history of the students was taken and clinical examination was carried out by physician to exclude any disease, mainly respiratory diseases. A verbal consent of all the subjects were taken and they are explained in the experimental procedure. An ethical approval to conduct the study was taken from the competent authority.

Physical measurements

The age in completed year, standing height in cm was measured with shoes removed, feet together and head in the Frankfort horizontal plane. Weight in kg was measured with shoes and Jackets removed. Body surface area (BSA) was calculated by Du-Bois and Du-Bois (1916) formula;

BSA (m^2) = (Body mass in kg)$^{0.425}$ × (Body Height in cm)$^{0.725}$ × .007184

Determination of vital capacity

Vital capacity was measured in the standing position with simple spirometer. The subject was asked to stand comfortably, facing the spirometer so that the subject can see the movement of the bell. The subject is asked to inspire as deeply and as fully as possible to fill the lungs. While keeping the nostrils closed with a nose clip and the mouthpiece held firmly between the lips, the subject is asked to expel all the air that she can with maximum effort into the spirometer. The forced expiration should be deep and quick but

without haste. Three satisfactory readings were taken at intervals of 5 min and the highest among the three was accepted (Ghai, 2007)

Statistical package for the social science (SPSS) version 11.5 was used for analysis. The comparison of mean values between Indian and Nepalese were performed by independent sample t-test. A stepwise, multiple, linear, regression equation were performed to formulate the prediction equation for vital capacity from age and anthropometric data.

RESULTS

Comparisons of physical characteristics including vital capacity of the Indian and Nepalese female young adults are shown in Table 1. There were no significant differences in age, height, weight and Body Surface Area (BSA) between the groups. Indian female young adults were found to have vital capacity of 2629.21 ml (± 449.97), whereas in case of Nepalese it was 2650.31 ml (± 464.34). No significant difference (P > 0.10) was found between the two populations. Highly significant correlation (r = 0. 96, p < 0.01) existed between the height of the subject and vital capacity.

Stepwise, multiple, linear, regression analysis shows that height is the best predictor for vital capacity (Figure 1). The regression equation based on height for the

combined subjects is:

$$VC = 26.2 \times H - 1467.21$$

Where;

VC = Vital capacity in ml and
H = Height in cm.

DISCUSSION

Various workers have studied the vital capacity values in healthy individuals. Here in this study vital capacity of Nepalese females has been compared with Indian counterparts. From the study, it was found that there was no significant difference in mean vital capacity between Nepalese and Indian females. The mean value of vital capacity of Indian females in this study is similar with values found in other Indian studies (Dikshit et al., 2005).

There is no such work performed primarily to measure vital capacity of Nepalese females. There are many studies carried out in India to measure vital capacity and their prediction equations. It may be recommended that prediction equations made from Indian studies can be used to predict the vital capacity of Nepalese young adult female as no significant difference was observed in vital capacity of Indian and Nepalese females. Therefore, the study had tried to formulate the prediction equation by different physical parameters with combined subjects (both Indian and Nepalese females) by stepwise multiple linear regression analysis. It was found that height was the best predictor to measure Vital capacity. This finding is highly correlated with other Indian studies where height was the best predictor to formulate vital capacity (Raju et al., 2004; Virani et al., 2001).

It can be concluded from the present study that Indian prediction equations can be used to measure vital capacity of Nepalese adult females. However, no attempt has been made to evaluate the suitability of Indian prediction equation for Nepalese healthy adult females. So, further study is required for this. However, the study tried to make a prediction equation with combined Indian and Nepalese young adults to predict vital capacity from height by multiple linear regression equation.

Conclusion

It can be concluded that as there was no significant difference in mean vital capacity of Indian and Nepalese adult female in this present study, prediction equations made for Indian adult females can be used to predict vital capacity of Nepalese adult female. From the present study, it may also be concluded that height is the best predictor for the measurement of vital capacity.

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