

Association between carrying school bags and lung functions among elementary school children in Al Hilla City ,2015

Prof. Dr. Hasan Alwan Baiee
Sarah Ala'a Abbas
Babylon University

Introduction

- All over the world there is an outcry by children, parents, school officials about the carrying of backpack loads more than the recommended safe limits.
- Primary school children experience a period of highest degree of **growth and development**, so excessive stress on the body of the child may result in harmful effects.

- Significant forward lean of head and trunk of children's body causing short and long term health problems.
- Carrying heavy school bags on shoulders affects the chest expansion and causes changes in **lung functions**.
- The **American Physical Therapy Association** recommended that the weight of the school bag should be less than **15%** of the total body weight of the child.

- While the **American Academic Orthopedic Surgeons** recommended that the school bag weight limits should not be more than **10%** of the child's body weight.
- Going through literature there are limited studies about the effects of backpack load placement on pulmonary functions of schoolchildren.
- In **Iraq** no previous study addressed the effect of backpacks on the lung parameters of school children.

Objectives

This study was conducted to identify the **prevalence** of heavy school bags among primary school children in Al-Hilla city, and to assess the effects of bags on the **pulmonary functions** of school children.

Materials & Methods

Study design:

cross sectional study.

Study location:

This study was carried out on pupils from **four** primary schools which were randomly selected in Al-Hilla city.

Period of the study:

The study started from the beginning of February through May, 2015.

Study sampling:

This study was conducted on 220 primary school children, 5th & 6th grades, aged 11 and 12 years, which were selected in convenient way.

Both parental and child written and verbal consents were obtained before participation in the study.

Instruments:

Questionnaire, spirometer (Discovery-2 USA), electronic weight scale and height scale .

3. Body Mass Index:

BMI was calculated using the following equation⁽⁸⁷⁾:

$$\text{Weight (kilogram)}/\text{height}^2 \text{ (meter}^2\text{)}$$

4. Backpack weight as a percentage of the body weight:

The percent of the school bag weight to the body weight was calculated using the following equation:

$$\frac{\text{School bag weight}}{BW} \times 100 \%$$

Spirometer

Lung function was measured by using an electronic portable spirometer.

The procedure was explained to the pupil, then the test was performed in standing position without backpack, using a disposable bacterial/viral filter, mouth piece and nasal clips, then the procedure was repeated after **five minutes** after carrying the backpack over the shoulders.

Identification **number** for each participant, **date** of birth, **gender**, **race**, **smoking** habit, **weight** in kilogram and **height** in centimeters.

The spirometer gives the results as printable graph which include the following values:

- **The expected (predictive) values** which depend on the entered information.
- **The best (actual) one of three tests values** which is based on performance of maximal inspiration and expiration of the child.



Figure 3.3: Spirometric measurement with and without backpack

Results

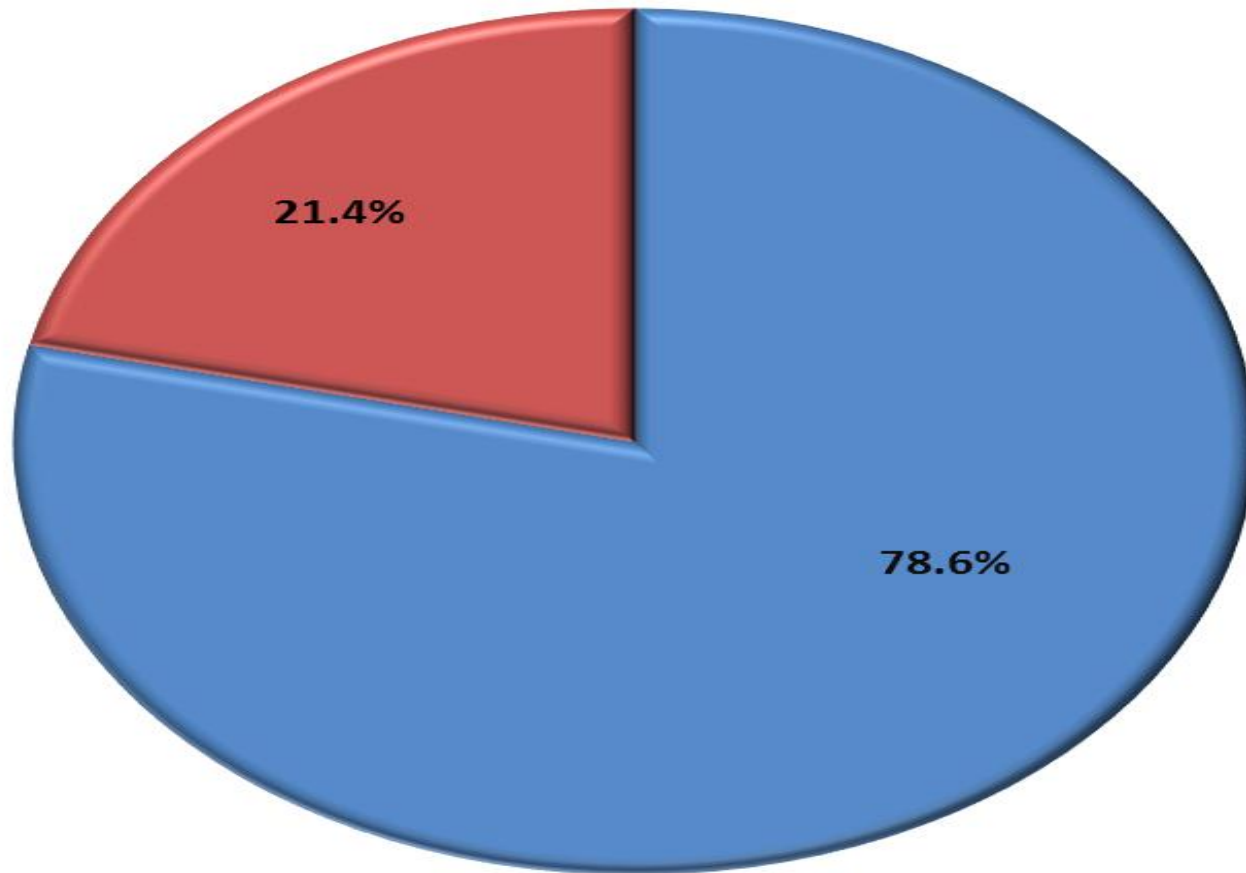
Table 4.1: Baseline characteristics (means and standard deviations) of the study group (n=220)

Variables	Means \pm SD
Age(years)	11.6 \pm 0.4
Height (cm)	143 \pm 7
Weight (kg)	39.87 \pm 6.66
BMI (kg/m ²)	19.29 \pm 1.95
Weight of bag (kg)	5.50 \pm 1.17
Weight of bag to body percent(%)	13 \pm 3

Prevalence of heavy school bag

Variable	Frequency No. (%)
Weight of bag percent	
<10%	47 (21.4)
10-15%	114 (51.8)
>15%	59 (26.8)
Total	220 (100.0)

Distribution of pupils according to the weight of backpack



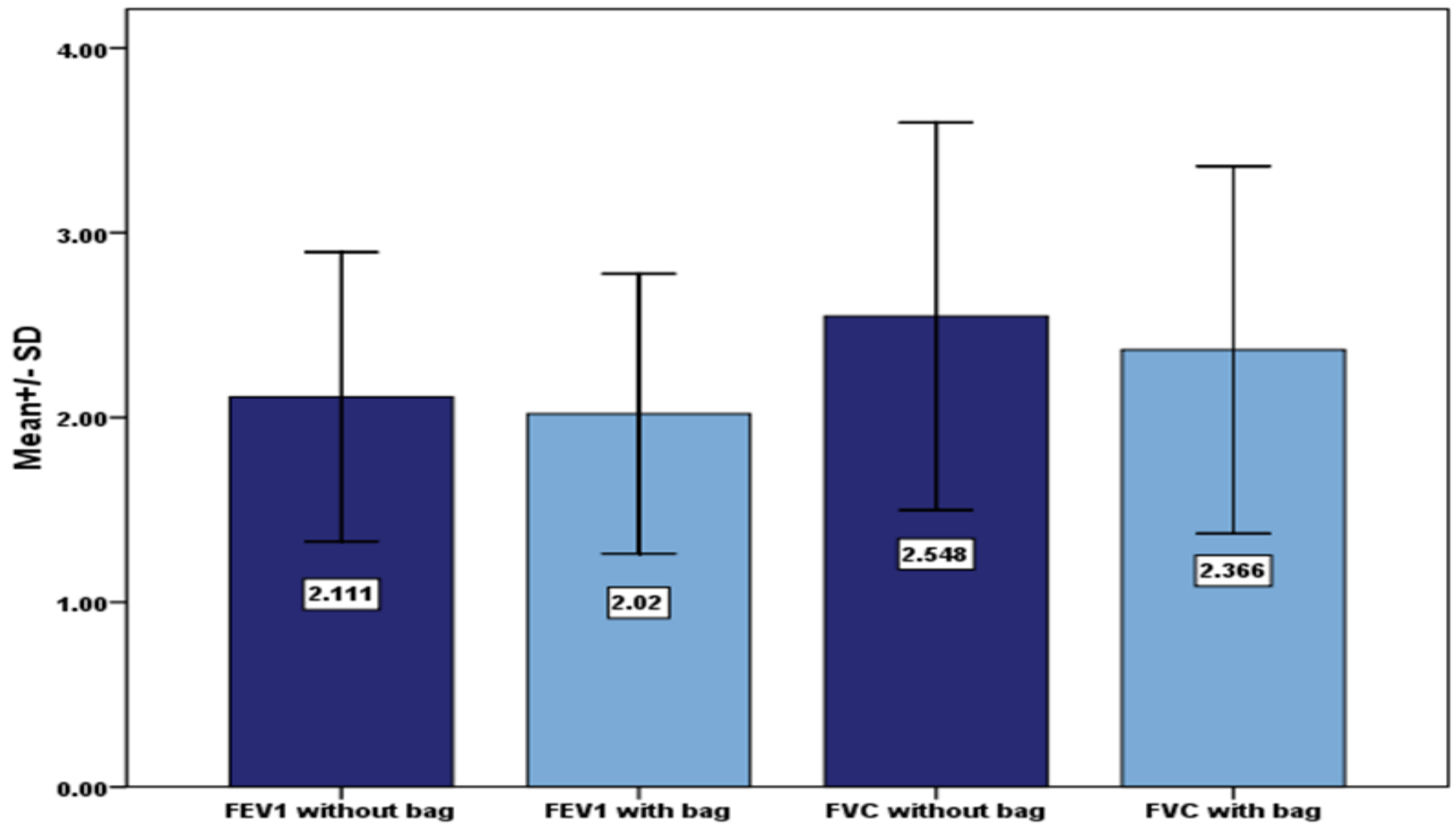


Figure 4.3: Distribution of pupils by the actual FEV1 and FVC with and without carrying the bag

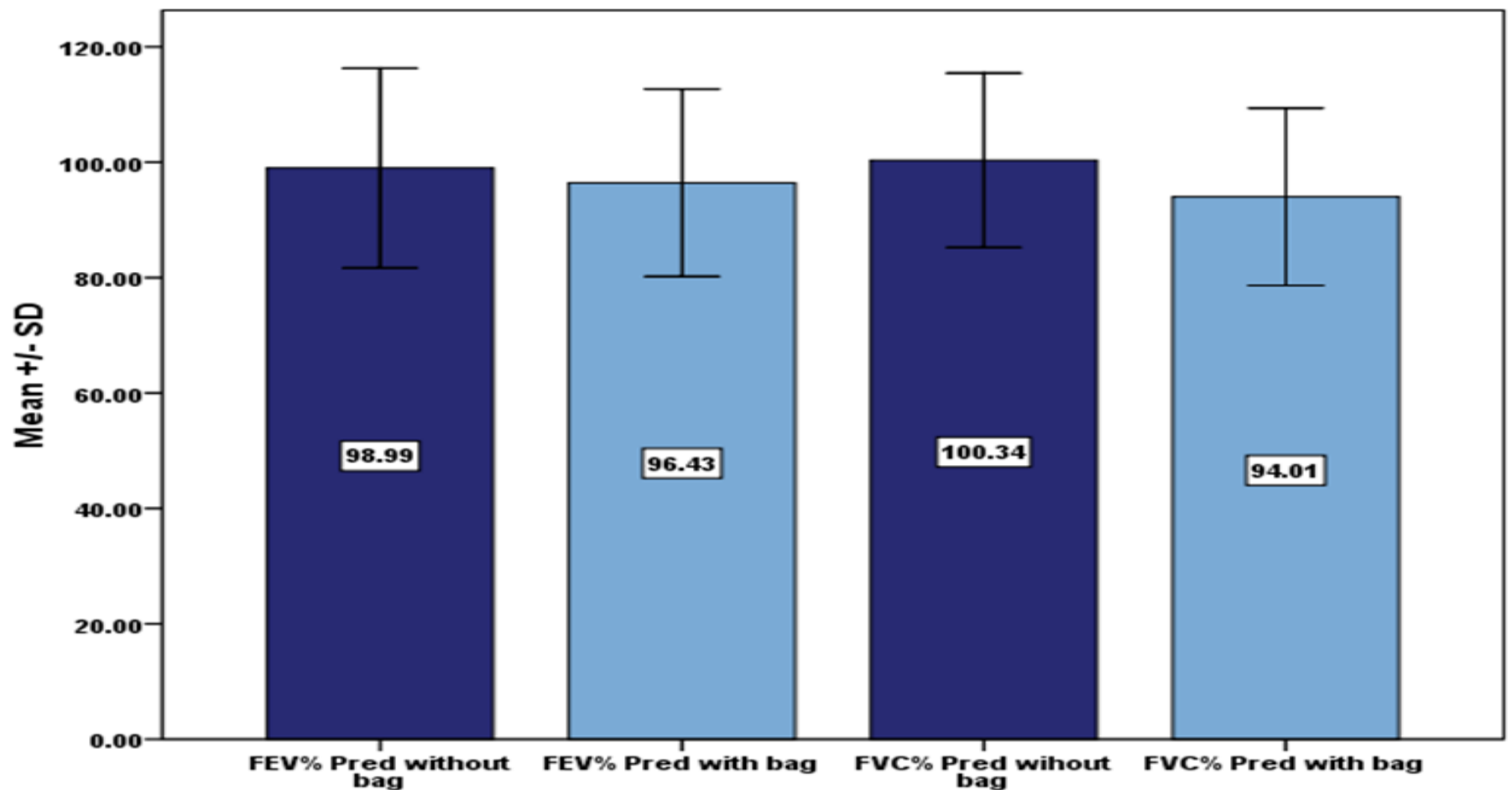


Figure 4.4: Distribution of pupils by the percent predicted of FEV1 and FVC with and without carrying the bag

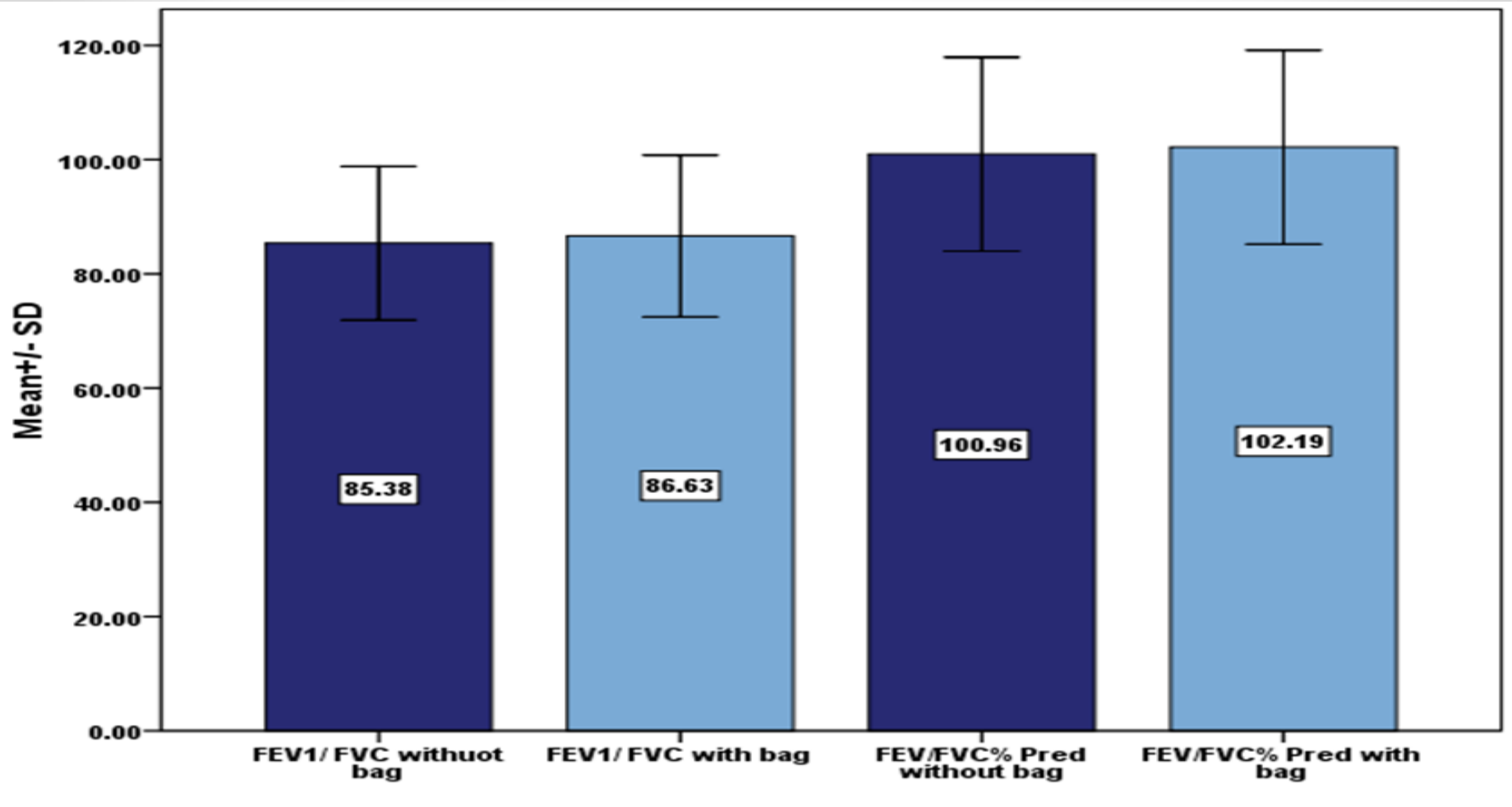


Figure 4.5: Distribution of pupils by the actual and the percent predicted FEV1/FVC with and without carrying backpack

Conclusions

- The school children carry **backpack load** more than the recommended limit.
- There is no association between weight of school bag and **gender**.

- There was a significant reduction in the **pulmonary function parameters** including: **FEV1** and **FVC** with exception of **FEV1/FVC** which was increased after carrying a backpack.

Recommendations

- ✓ Preparing enough and suitable **lockers** for each student in our primary school.
- ✓ Encourage schools to use **CD-ROMs** and **electronic books**.
- ✓ Raise the **public awareness** about the health effects of heavy backpacks through different types of media.
- ✓ Encourage the **parents** to buy the best **type of bags** to their children.
- ✓ Educate the students about the **proper way** of carrying the backpack.

- **Training courses** should be started for school teachers, headmasters, parents-school associations and physicians of school health services about the importance and the prevention of this health problem.

Thank you