IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

EFFECT OF BACKPACK LOAD ON PULMONARY FUNCTION

[1]Megha Singh, [2]Dr. Ambreen Fatima (PT), [3]Dr. Shahiduz Zafar

[1] BPT Student, [2] Assistant Professor, [3] Professor

[1,2,3] Division of Physiotherapy,

[1,2,3] Galgotias University Greater Noida, Uttar Pradesh

Abstract: Background: The impact of carrying a heavyweight on physical performance has been studied in order to develop load limitations, and one of the key concerns has been the impact of backpack transportation on pulmonary function. Backpack load carrying compresses the spine symmetrically while maintaining stability). Forward trunk tilt, change in body centre of gravity (COG), and gait occur as a result of increasing backpack weight.

Materials & Methods: voluntary participation is taken of 40(n=40) (age=21-45) in the study. all participants are workers working in different factories and plants. two groups are divided. Group A and Group B people who don't lift heavy weight on their back while their workings. Group B people who carry heavy height while on their back while working. both groups are check for their pulmonary health using the lung function questionnaire, respirometry, and oximetry for lungs diffusion capacity. data was collected in google forms and analysed with the help of SPSS 21 and Ms excel.

Results: According to the research and data, there is a considerable difference in health between persons who carry weight on their backs in daily labour and those who do not. As shown in the Lung Function Questionnaire for Group A (21.17±10.706)> Group B (15.17±6.3546), Group B's lung health is compromised. There are substantial differences in lung diffusion levels between the two groups (GROUP A 97.402±3.603)> (GROUP B 94.782±9.864), indicating that the lungs diffusion level is also influenced in both groups.

Conclusion: We can deduce from this study that people who carry weight on their backs in daily activities have reduced lung function.

Index Terms **- Pulmonary Function Backpack Load Respiratory System**

I. INTRODUCTION

The respiratory system is made up of all of the organs involved in breathing (pulmonary system)[1]. They include the nose, pharynx, larynx, trachea, bronchi, and lungs[2]. The respiratory system has two functions: it transports oxygen into our bodies, which our cells need to survive and operate properly, and it helps remove carbon dioxide, which is a waste product of cellular function[3]. A system of pipes connects the nose, throat, larynx, trachea, and bronchi to transfer air to our lungs[4]. Microscopic air sacs called alveoli pump oxygen into the bloodstream while releasing carbon dioxide into the atmosphere[5]. When something goes wrong with a part of the respiratory system, such as a pneumonia infection, it becomes more difficult for people to get enough oxygen and expel the waste product carbon dioxide[6]. Respiratory symptoms such as shortness of breath, coughing, and chest pain are all prevalent[7].

As you breathe in, air enters your body through your nose or mouth, forming the trachea and upper airway. Before reaching your lungs, it travels down your neck, past the larynx (or voice box), and into the trachea (or windpipe)[8]. All of these systems work together to deliver fresh air from the outside world inside your body[9]. The upper airway is critical for breathing because it must remain open at all times. As it passes through your lungs, the air moistens and warms them[10]. The lungs are a pair of cone-shaped organs that take up the majority of our chest space, along with the heart[9]. They assist in the expulsion of carbon dioxide, a waste product, by bringing oxygen into the body, which our cells require in order to survive and operate properly[11]. There are two lungs in each of us: one on the left and one on the right. These are divided into lobes, which are large sections of tissue divided by dividers or fissures[12]. Because the heart occupies some of the space on the left side of our chest, the right lung has three lobes whereas the left lung only has two[13]. Bronchopulmonary segments, which are even smaller segments of the lungs, can be further divided. Membranes separate this segment from the others in a pyramidal shape[14]. Each lung contains roughly ten of them. Each section has its own blood and oxygen supply[7]. The lungs are vascular organs, meaning they receive a lot of blood. This is the case because the pulmonary arteries, which supply the lungs, originate on the right side of the heart[13]. They carry low-oxygen, high-carbon dioxide blood into your lungs, allowing the carbon dioxide to be evacuated and more oxygen to be absorbed[11]. The newly oxygenated blood is subsequently returned to your heart's left side via the pulmonary veins. It is then circulated throughout the body, providing oxygen to cells and organs.

STATEMENT QUESTION

Is there any effect of backpack load on pulmonary function?

AIMS AND OBJECTIVES OF THE STUDY

The main aim of the study is to find effect of backpack load on pulmonary function.

The primary goal of this research is to determine the impact of backpack load on pulmonary function.

Hypothesis of research – SIGNIFICANT EFFECT OF BACKPACK LOAD ON PULMONARY FUNCTION

Null Hypothesis: NO EFFECT OF BACKPACK LOAD ON PULMONARY FUNCTION

Methodology

Type of study: A clinical study.

Sampling: Simple Random Sampling

Area of Project: Delhi NCR

Sampling Method:

- No of Sample:40
- Sample place: Multicentric Grounds

Inclusion Criteria:

1. Age 21 – 45.
2. Factory workers.
3. Carry weight as there daily works in factory.

Exclusion Criteria:

1. Essential workers.
2. Involved in Physical workout.
3. In lockdown for more than 6 months.

Instrumentation:

1. LUNG FUNCTION QUESTIONNAIRE
2. RESPIROMETRY
3. OXIMETRY

PROCEDURE

Voluntary participation is taken of 40(n=40) (age=21-45) in the study. All participants are workers working in different factories and plants. Two groups are divided. GROPU A(20) and B(20). All participants filled out a consent form and provided their permission to participate in the study, after which they filled out demographic information such as their name, age, height, weight, gender, and occupation. After that, the following measurements were introduced:

1. Consent Form: This form included information about the study's purpose and expected outcomes, as well as allowing participants to give their consent and participate anonymously. The subjects were assured that their information would be kept private, and that they would not be compensated or given credit for their involvement in the study because it was voluntary.
2. Following the completion of the consent form, demographic information was collected, including name, age, gender, height, occupation, and address.
3. All the participants were asked to fill the questioner made with LUNG FUNCTION QUESTIONNAIRE.
4. Then was asked to perform respirometer blowing test.
5. Oximetry for lungs diffusion capacity check.
6. Data was stored in excel sheets of a google form
7. Data was analysed with SPSS 26

Fig.1 lungs diffusion level check

Result Analysis Heading

Data Analysis: Data analysis was done under the Social Science Packaging Software SPSS 26.0 version. An independent T-test and paired t-test were used for readings. The graphical representation is done using MS EXCEL 2016.

Result

According to the research and data, there is a considerable difference in health between persons who carry weight on their backs in daily labour and those who do not. As shown in the Lung Function Questionnaire for Group A (21.17±10.706)> Group B (15.17±6.3546), Group B's lung health is compromised. There are substantial differences in lung diffusion levels between the two groups (GROUP A 97.402±3.603)> (GROUP B 94.782±9.864), indicating that the lungs diffusion level is also influenced in both groups.

LIST OF TABLES

Table no 1: Demographic descriptive statistics

	AGE	WEIGHT
Mean	35.47	65.87
N	40	40
Std. Deviation	4.776	9.544

Table no 2: Lung function questionnaire. (sample t-test)

	MEAN±SD	T-TEST	P VALUE
GROUP A SCORE(20)	21.17±10.706	7.759	P<0.005
GROUP B SCORE (20)	15.17±6.3546	7.686	P<0.005

Table no 3: Respirometer blowing timings(seconds)

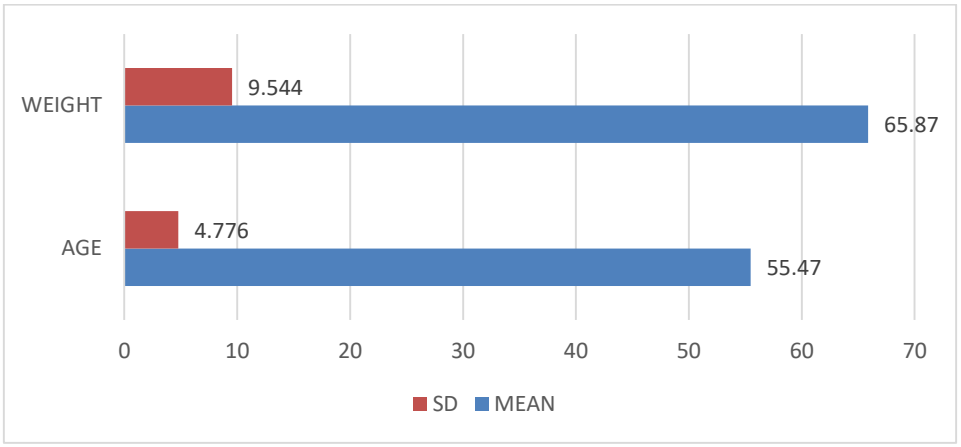
	MEAN±SD	T-TEST	P VALUE
GROUP A SCCORE	15.39±3.603	5.679	P<0.005
GROUP B SCORE	7.18±2.782	4.965	P<0.005

Table no 4: Oximetry reading for lungs diffusion.

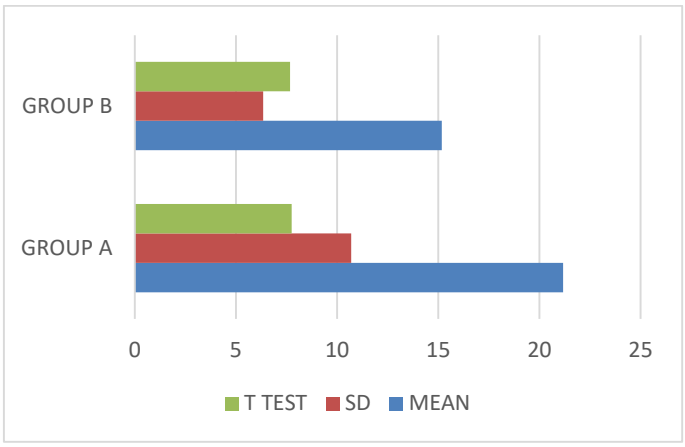
	MEAN±SD	T-TEST	P VALUE
GROUP A SCCORE	97.40±23.603	33.787	P<0.005
GROUP B SCORE	94.78±29.864	29.689	P<0.005

LIST OF GRAPHS:

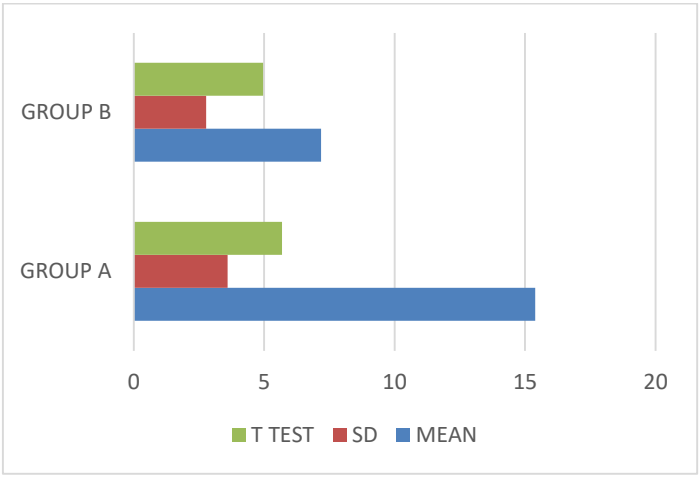
1. Demographic descriptive statistics



2. Graph showing lung function questionnaire (sample t-test)



3. Graph showing respirometer blowing timings(seconds)



Discussion

According to research and data, there is a considerable difference in health between persons who carry weight on their backs in everyday labour and those who do not. The Lung Function Questionnaire for Group A (21.1710.706)> Group B shows that their lung health has declined (15.176.3546). Lung diffusion levels change considerably between the two groups (GROUP A 97.4023.603)> (GROUP B 94.7829.864), indicating that both groups' lung diffusion levels are altered. Saraa Alaa et al(1). found comparable results in their research. Schoolchildren utilize backpacks to transport their things. Heavy backpacks have been linked to a number of negative health impacts in children, as well as interfering with their academic performance. The goal of this study was to see how school bags affected the lung functions of students in Al- Hilla. This is a descriptive school-based cross-sectional study that was conducted from February to May 2015 on a convenient sample of 220 healthy fifth and sixth grade students from four randomly selected primary schools. The students' and their parents' written and verbal consents were obtained. Data was gathered by interviewing participants using a standardized questionnaire that included sociodemographic and school bag-related questions. After evaluating the participants' weight and height, a pulmonary function test was performed using an electronic portable spirometer (discovery-2 USA). Except for the FEV1/FVC ratio, which increased after carrying the backpack (p value 0.001), pulmonary function indices were considerably lowered (p value 0.001). The findings show that after carrying the backpack, elementary school children's ventilatory functions were significantly reduced. To protect schoolchildren, preventative actions are required. Daniel H. K. Chow et al(17). produced similar results. To see if the suggested backpack load limitations for regular schools apply to research participants with AIS. There was no association between load and group, showing that both normal and AIS pulmonary performance were affected similarly by backpack loading. All lung measures in the AIS group were significantly lower than in the control group, particularly the mentioned FVC and PEF. A significant decline in FVC and FEV1 was observed as backpack load increased, and the load at which these changes were found to be important was lower than previously reported.

Conclusion

We can deduce from this study that people who carry weight on their backs in daily activities have reduced lung function.

Future scope of study

Future study can be done on comparing different groups on posture and other activities.

Conflict of interest: - There is conflict of interest.

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