



## A STUDY ON IMMEDIATE EFFECT OF SMOKING ON YOUNG ATHLETES IN RESPECT OF SELECTED PHYSIOLOGICAL VARIABLES INFLUENCING AEROBIC PERFORMANCE

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### Abstract:

Immediate effect of smoking on young athletes in respect of selected physiological variables influencing aerobic performance. The purpose of this research was to investigate immediate effect of smoking on aerobic performance to promote or reject smoking before any cardiovascular endurance activity. For this experiment 16 young athletes age between 20 to 24 years with Mean age of approximately 23 years were randomly selected as subject; and for physiological variables those are closely associated with aerobic capacity were selected, Tests - i. Pulse Rate per Minute: Before Cooper Test (CT) – Immediate after completion of CT – 3 Minutes after recovery; ii. Blood Pressure in mmHg: Before CT - 3 Minutes after recovery; iii. Forced Vital Capacity (FVC) in Liters/Minute: Before CT – 3 Minutes after recovery; iv. Oxygen Saturation (SpO<sub>2</sub>) in Percentage: Before Cooper Test (CT) – Immediate after completion of CT – 3 Minutes after recovery; v. Blood Sugar in mmole/Liter: Before CT - 3 Minutes after recovery; and to find performance Cooper Test (CT) to measure Cardiovascular Endurance in Kilometer were selected. Researchers came to following conclusion out of thorough and judicious analysis from collected data.

- a. Smoking influenced on the pulse rate taken before the aerobic capacity test.
- b. Blood Presser level rose test taken immediate before CT test in both systolic and diastolic due to smoking cigarette.
- c. Lung capacity measured in FVC remarkably influenced by smoking.

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- d. SpO<sub>2</sub> remain in normal range before CT and 3 minutes after with smoking and without smoking but immediate after test score hit to 80% in both the conditions. No impact of smoking was recorded on O<sub>2</sub> saturation in terms of Mean value.
- e. Smoking increased Blood sugar level in 3 minutes after recovery test.
- f. Cooper test performance scores were severely reduced by smoking.
- g. On Body Mass Index Smoking had very little or no impact in investigation.

**Keywords:** smoking, young athletes, aerobic performance

## 1. Introduction

Now a day everyone is well aware of the ill consequence like: Smoking-caused lung cancer, other cancers, heart disease, and stroke typically do not occur until years after a person's first cigarette of smoking cigarette but so many a young athletes believe that smoking just before exercise help them to perform better. However, there are many serious harms from smoking that occur much sooner. In fact, smoking has numerous immediate health effects on the brain and on the respiratory, cardiovascular, gastrointestinal, immune and metabolic systems. Thus, researchers have taken their interest to justify about the claim of young athletes whether really smoking cigarette help them physiologically and in performance.

This research leads to the immediate effect of smoking on major physiological factors during aerobic exercise and consequential performance. To test physiological effects researchers have selected Pulse Rate, Blood Pressure, Forced Vital Capacity, O<sub>2</sub> saturation in Blood, Blood Sugar and cooper Test to assess aerobic performance.

## 2. Methods

### 2.1 Subjects

Researchers were randomly selected 16 young athletes from Jessore University of Science and Technology age range between 20 to 24 years and the Mean age was about 23 years. Most of them were somewhat involved in sports and physical exercise and none of they were high level performer.

### 2.2 Used Devices

**Table 1:** Used Devices

SL	Instruments	Brand	Function
01	Treadmill	KPOWER, K253A-B	Aerobic Test

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02	Pulse Oximeter	Carewell	Pulse Rate & O <sub>2</sub> Saturation
03	Glucometer	On Call Plus	Blood Sugar
04	Spirometer	Wright Peak Flow Meter Clement Clarke Int. Ltd.	Lung Function
05	Sphygmomanometer	SCIAN, ID 578	Blood Pressure
06	Body Height Scale	TCS-200-RT, Electronic Body Scale	Body Height
07	BMI Scale	Digital BMI Scale, Tanita	BMI

### 2.3 Test Administration

Investigators used Special Theory and Method of Training (SPMT) Laboratory and exercise Physiology Laboratory of Physical Education and Sports Science Department of Jessore University of Science and Technology in the purpose of data collection.



**Picture 1-7: Used Instruments**

**A. Treadmill:** Researchers used Motorized Treadmill/Commercial Class SC/ max. 180 kg, Console 7-Window LED, Motor AC, Peak 6.0HP/ Con. 4.0 HP, Speed 1-25 km/h (9 Quick-Speed), Incline Motor 0 - 15% (7 Quick-Incline), Running Surface 580 X 1660 mm to take Cooper Test.

**B. Pulse Oximeter:** Scholars made use of 1Dual-color LCD display, brightness 4-level adjustable, 14-direction readings automatically, 16 display modes, 1Display of SpO<sub>2</sub>, PR, SpO<sub>2</sub> bar graph, PR waveform, 1Auto-OFF after 8 seconds without operation, 1Visual alarm of low battery capacity, 1Less than 0.4% perfusion Pulse Oximeter to find Pulse and O<sub>2</sub> saturation in blood.

**C. Glucometer:** Accurate results in 10 seconds, Glucose Oxidase enzyme means no interference from Icodextrin, Maltose, Galactose at normal physiological and therapeutic levels, 300 test memory with date and time; Investigators used it for blood sugar analysis.

**D. Spirometer:** mini- Peak Flow Meter of analog version was used to measure Forced Vital Capacity (FVC) was used by the scholars to study lungs function.

**E. Sphygmomanometer:** This device adopts oscillometric technology with Fuzzy Algorithms, measuring arterial blood pressure and pulse rate. The cuff is wrapped around the arm and automatically inflated by the air pump. The sensor of the device catches weak fluctuation of the pressure in the cuff produced by extension and contraction of the artery of the arm in response to each heartbeat. The amplitude of the pressure waves is measured, converted in millimeters of the mercury column and is displayed by digital value. This was used to measure Blood Pressure of the subject.

**F. Body Height Scale:** Weighing Capacity of 200 kg, Simple operation, 100g increment is ideal for dietary assessment and weight management, Dual Function with Weight and Height Rod, Easy portability, Versatile as the unit has an internal rechargeable battery and Power Adaptor; was used to find height of the young athletes by the Investigators.

**G. BMI Scale:** glass digital BMI scale with capacity of 200kg to find Body Mass Index of the subjects.

## 2. 4 Demonstration of the Test

To make understandable of the subject's concepts investigators had given several demonstrations along with verbal explanation concerning the test. Researcher took feedback from the subjects and made sure that there was no confusion among the subjects regarding their task.

## 2.5 Procedure

Subjects worn running shoes, short and T-shirts and run on the treadmill. They had been instructed not to eat any heavy meal in 2 hours before the test. Young players gave their test in 2 different days between 3 days of gap. First day they smoked half to one and half normal size cigarette available in Bangladesh market as per their preference before giving test, and in the second test day they did not smoked in last 24 hours. They had been properly motivated to perform their bet on the treadmill. Researchers collected height and weight to calculate BMI. In both the days subjects gave their following test i. Pulse Rate per Minute: Before Cooper Test (CT) – Immediate after completion of CT – 3 Minutes after recovery; ii. Blood Pressure in mmHg: Before CT - 3 Minutes after recovery; iii. Forced Vital Capacity (FVC) in Liters/Minute: Before CT – 3 Minutes after recovery; iv. Oxygen Saturation in Percentage: Before Cooper Test (CT) – Immediate after completion of CT – 3 Minutes after recovery; v. Blood Sugar in mmole/Liter: Before CT - 3 Minutes after recovery; vi. Cooper Test (CT) to measure Cardiovascular Endurance in Kilometer. Data were collected and noted with the 4 well trained assistants.

**Table 3:** Tests taken with and without smoking

Name of Test	Before Cooper Test (CT)	Immediate after completion of CT	3 Minutes after recovery from CT	Unit
Pulse Rate	X	X	X	P/M
Blood Pressure	X		X	mmHg
FVC	X		X	Lit/Min
SpO <sub>2</sub>	X	X	X	%
Blood Sugar	X		X	mmol/L
Cooper Test		X		Km
BMI		X		Numeric

## 2.6 Trials

Most of the athletes had no previous experience of running on treadmill and concept of cooper test thus scholars brought all the subject in trial complete test for once three days prior to the day of first smoking test day. These three days is enough time to get recovery which researchers ensured.

## 2.7 Collection of Data

Data was collected in 2 different days with pus of 3 days in between; first day with smoking and on second test day without smoking with the assistance of 4 well trained assistances.

### 2.8 Limitations

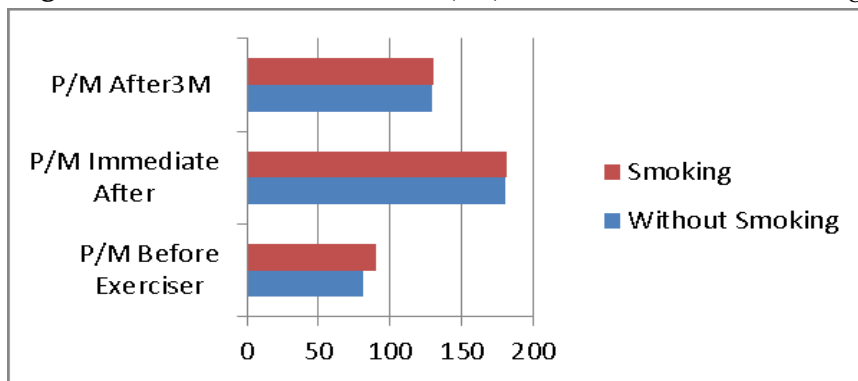
There was some situation and condition which were out of researchers control i.e. - day temperature; food of subjects since they live in different places and food habit also different; smoke tolerance; and psychology etc.

### 2.9 Statistical Analysis

In the purpose of statistical analysis of collected data, investigators used Range, Mean, Difference and standard deviation as tools with the help of Microsoft Excel.

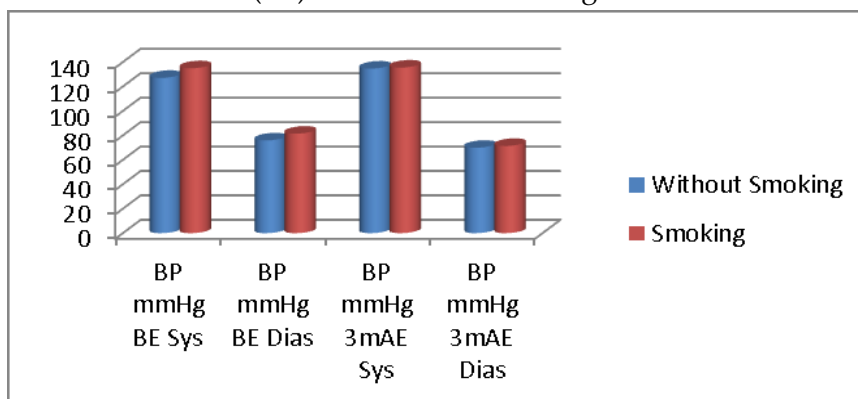
### 3. Results and Discussion

**Figure 1: Bar Chart of Pulse Rate (PR) with and Without Smoking**



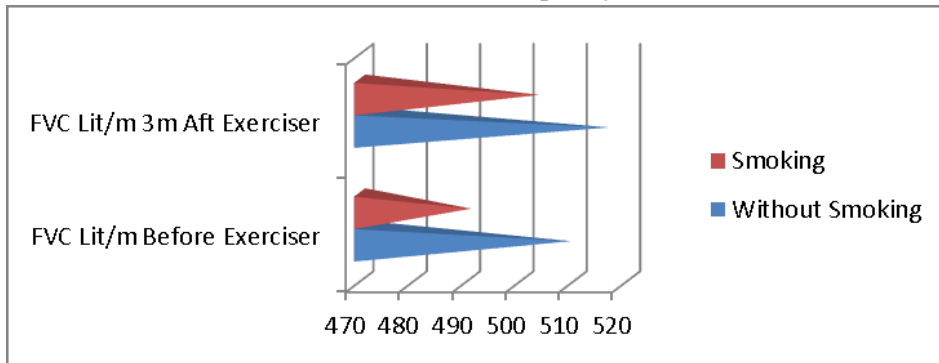
Bar Chart shows that pulse taken before the cooper test it was found little (10 bits) higher than test taken in nonsmoking condition but result taken immediate after CT was same and three minutes after recovery pulse rate was very close but smoking test was negligibly higher.

**Figure 2: Blood Pressure (BP) Mean value in mmHg with and without smoking**



Blood Presser test result showed that systolic diastolic BP was little higher test given before going on the treadmill in the condition of smoking and test taken in other two conditions systolic and diastolic rose at the same peak of approximately 135/70 mmHg.

**Figure 3:** Mean value of Forced Vital Capacity (FVC) in Liters/Minutes



Lung capacity significantly dropped in both the tests taken before and after cooper test during smoking condition. Difference was more in FVC test score given before exercise but in both the cases 3 minutes after exercise test result increased than previous test result.

**Figure 4A and 4B:** Mean value of Oxygen saturation (SpO<sub>2</sub>) in Blood in percentage (4A) and SpO<sub>2</sub> SD (4B)

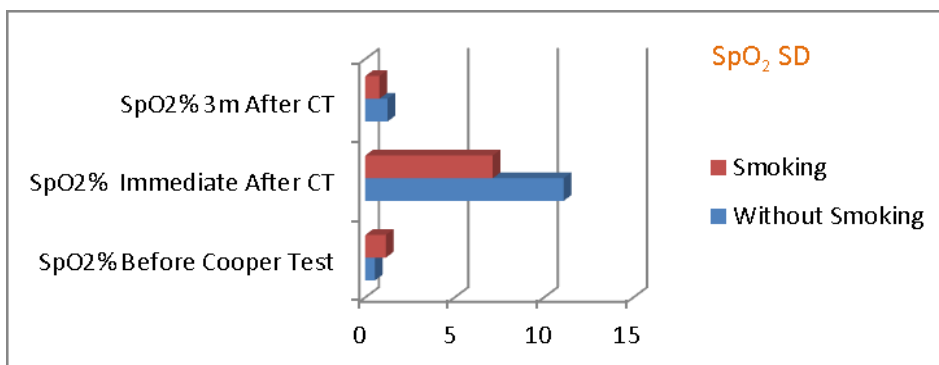
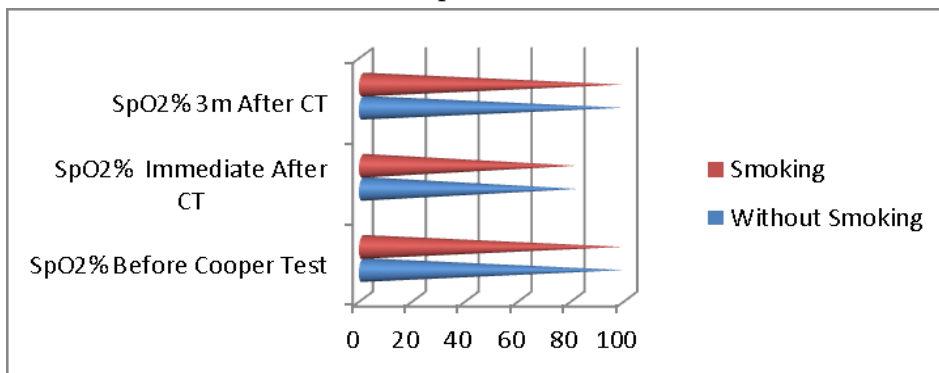
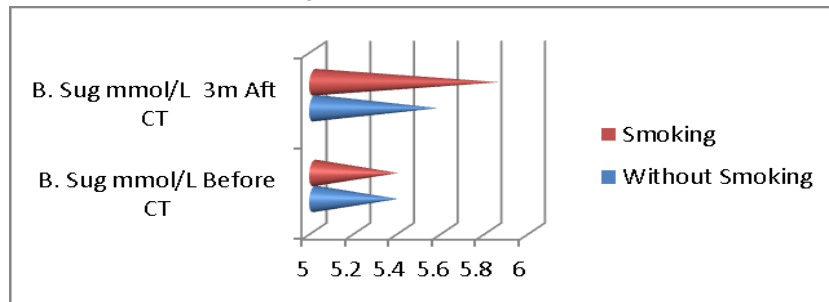


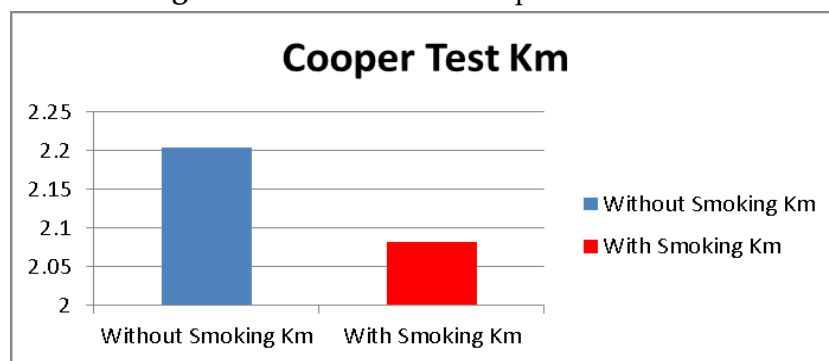
Figure 4A depicts Mean value of O<sub>2</sub> saturation in remained same in all the three tests taken before, immediate after and three minutes after the cooper test in both the situations but test taken immediate after CT score came down to 80%. Figure 4B shows in all the cases there was standard deviation and in the test taken immediate after CT was about 4 score less than the nonsmoking situation.

**Figure 5: Blood Sugar (RBS) Test Mean value in mmol/L**



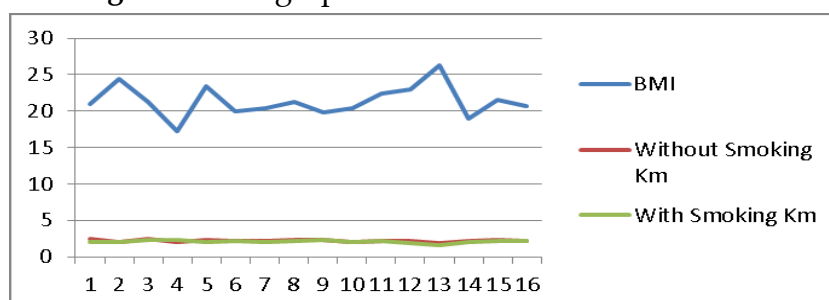
In terms of blood sugar test given before CT with and without smoking was exactly the same but test taken three minutes after the CT was found Mean value 0.30 mmol/L higher in the smoking state.

**Figure 6: Mean value of Cooper Test in Km**



Column chart of Cooper Test depict that mean value with smoking is significantly lower that of test given without smoking is about 200 Meters difference.

**Figure 7: Line graph of BMI and CTs value in Km**





Line graph of smoking and nonsmoking CT tests scores remain the same according to BMI. BMI did not play any visible role on BMI specific in two different conditions.

#### 4. Conclusion

Researchers selected 16 young athletes randomly for this study and physiological tests- Pulse Rate, Blood Pressure, Cardiovascular Capacity, Oxygen Saturation Level, Blood Sugar and Cooper Test for performance testing. Investigators analyzed two different test result one taken without smoking and another taken after smoking.

The purpose of this study was to investigate immediate effect of smoking on young athletes in respect of selected physiological variables influencing aerobic performance.

In this regard researchers data from Pulse Rate, Blood Pressure, Cardiovascular Capacity, Oxygen Saturation Level, Blood Sugar and Cooper tests and analyzed using statistical tools like Range, Mean Standard Deviation. Findings of the study are as follows:

- a. Smoking influenced on the pulse rate taken before the aerobic capacity test.
- b. Blood Pressure level rose test taken immediate before CT test in both systolic and diastolic due to smoking cigarette.
- c. Lung capacity measured in FVC remarkably influenced by smoking.
- d. SpO<sub>2</sub> remain in normal range before CT and 3 minutes after with smoking and without smoking but immediate after test score hit to 80% in both the conditions. No impact of smoking was recorded on O<sub>2</sub> saturation in terms of Mean value.
- e. Smoking increased Blood sugar level in 3 minutes after recovery test.
- f. Cooper test performance scores were severely reduced by smoking.
- g. On Body Mass Index Smoking had very little or no impact in investigation.

#### 5. Recommendations

Smoking cigarette immediate before endurance activity negatively affect on different physiological abilities, those are determining factor of cardiovascular endurance and impair aerobic performance. Though, on some physiological variables effect of smoking were no reported but in most of the physiological variables, its negative impact had been strongly observed. Researchers strongly recommend not smoking cigarette before any endurance activity for the young athletes. Moreover, Investigators also recommend to carrying out further researches in this field with other physiological variables those are determining factor for cardiovascular endurance.

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