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## Comparative study of selected cardio respiratory variables of industrial and non-industrial inhabitants

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### Abstract

The study aimed to compare the cardio respiratory variables of Industrial and Non-industrial inhabitants of Amravati city. A total of fifty (50) subjects, comprising 25 industrial and 25 as Non-industrial inhabitants of Amravati city which were randomly selected for the study. The Subjects were selected by using simple random sampling. The age of the subjects ranged between 25-35 years. To analyze the cardio respiratory variables such as Haemoglobin amount, Exhale capacity, Resting heart rate and VO<sub>2</sub> Max. Of the subjects of both the groups i.e. Industrial and non-Industrial group the following tests or equipments were used. Haemometer for measuring Haemoglobin percentage or amount. Peak flow meter for measuring Exhale capacity. A digital Stop watch for recording time during Heart Rate count. Vo<sub>2</sub>max. Bench for Cardiovascular Endurance of both Industrial and Non-industrial inhabitants the games. The analysis of data was done by using statistical technique 't'- test for finding the significance difference of selected Cardio Respiratory variables between Industrial and Non-industrial inhabitants of Amravati city and the level of significance was set at 0.05 levels ( $p < 0.05$ ). The findings means and standard deviation of selected cardio respiratory variables of industrial inhabitants viz. Haemoglobin amount is ( $12.82 \pm 1.07$ ), Exhale capacity is ( $398.4 \pm 64.91$ ), Resting heart rate is ( $77.66 \pm 6.09$ ) and VO<sub>2</sub> Max is ( $58.24 \pm 7.25$ ) and the findings means and standard deviation of selected cardio respiratory variables of Non-industrial inhabitants viz. Haemoglobin amount is ( $13.87 \pm 2.93$ ), Exhale capacity is ( $448 \pm 66.39$ ), and Resting heart rate is ( $73.84 \pm 5.25$ ) and VO<sub>2</sub> Max is ( $61.66 \pm 5.52$ ). Hence the Non-industrial inhabitants were found with sound cardio respiratory capacities as compared to Industrial Inhabitants the difference might be due to the pollution of industries which directly or indirectly affects the population (people) residing in industrial area.

**Keywords:** cardio-respiratory, exhale capacity, resting heart rate, industrial inhabitants, haemoglobin, vo<sub>2</sub> max

### Introduction

Man is basically an intruder in natural landscape. Unprecedented population growth unplanned industrialization have brought the manmade and natural environment into conflict to set a degree that not only his sound, economic and social development un-degraded but also the physical, social, esthetics, and spiritual well being of man is jeopardized. The industrial society is approaching across road. The human population has expended three folds in the past ninety years fossil fuel consumption as increased thirty times an industrial pollution has increased by fifty folds. Obviously this pattern cannot continue indefinitely what kind of industrial society we want. This has been an area of thinking today. Never before in the history of mankind man has faced such a severe crises of self destruction as he faces today. The air pollution and bottom ash generated because considerable health problems, especially related to respiratory health. conducted his study on "Cardiovascular Effects Of Air Pollution". Air pollution is a heterogeneous mixture of gases, liquids and PM (particulate matter). In the modern urban world, PM is principally derived from fossil fuel combustion with individual constituents varying in size from a few nanometers to 10 micron in diameter. In addition to the ambient concentration, the pollution source and chemical composition may play roles in determining the biological toxicity and subsequent health effects. Nevertheless, studies from across the world have consistently shown that both short- and long-term exposures to PM are associated with a host of cardiovascular diseases, including myocardial ischaemia and infarctions, heart failure, arrhythmias, strokes and increased cardiovascular mortality.

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**Procedure and Methodology**

Fifty subjects were selected for the collection of data which include 25 subjects from industrial zones and 25 from non industrial zones of Amravati city. The subjects were selected by simple random sampling method. The age of the subjects ranged between 25-35 years.

**Equipments Used For Collection of Data**

The various equipments that were used for the collection of data were Haemometer for measuring haemoglobin percentage. Peak flow meter for measuring exhale capacity. A digital Stop watch for recording time during pulse rate count. Vo<sub>2max</sub>. Bench for cardiovascular endurance.

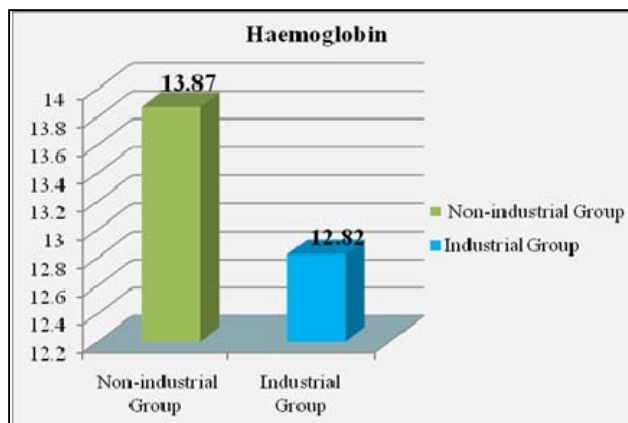
**Results**

**Table 1:** Haemoglobin Percentage between Industrial And Non-Industrial Inhabitants

Group	Mean	S.D.	M.D.	D.F.	O.T.	T.T.
Non-industrial	13.87	2.93	1.05	48	2.1	2.00
Industrial	12.82	1.07				

\*Level of Significance = 0.05  
Tabulated 't' 0.05 (48) = 2.00

Table-1 reveals that there is difference between means of Non-industrial and industrial group, because the mean of Non-industrial is 13.87, greater than Industrial which is 12.82, and their mean difference is 1.05. To check the significant difference of Haemoglobin between Non-Industrial and Industrial group the data is analyzed by applying 't' test. Before applying 't' test, standard deviation is calculated between Non-Industrial and Industrial group which is 2.93 and 1.07 respectively. After applying 't' test it was found that there is significant difference haemoglobin between industrial and non-industrial group because value of calculated 't' (2.1) which is greater than tabulated 't' (2.00) at 0.05 level of significance, which indicates or shows that there is a significant difference in haemoglobin percentage between industrial and non-industrial group.



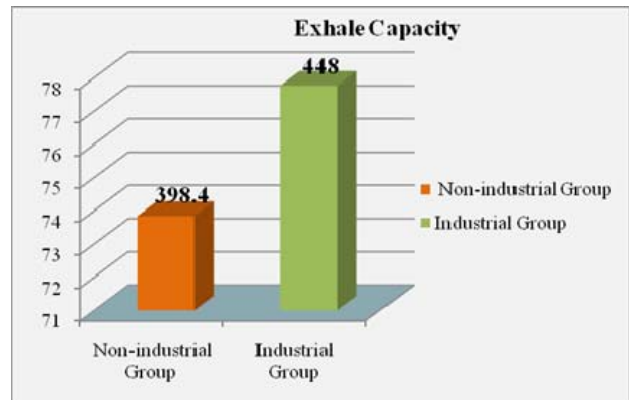
**Graph 1:** Graphical Representation of Mean Difference of Haemoglobin Percentage of Non-industrial and Industrial Group

**Table 2:** Exhale Capacity between Industrial And Non-industrial Inhabitants

Group	Mean	S.D.	M.D.	D.F.	O.T.	T.T.
Non-industrial	448	66.39	49.6	48	2.67	2.00
Industrial	398.4	64.91				

\*Level of Significance = 0.05  
Tabulated 't' 0.05 (48) = 2.00

Table-2 reveals that there is difference between means of Non-industrial and industrial group, because the mean of Non-industrial is 448, greater than Industrial which is 398.4, and their mean difference is 49.6. To check the significant difference of Exhale Capacity between Non-Industrial and Industrial group the data is analyzed by applying 't' test. Before applying 't' test, standard deviation is calculated between Non-Industrial and Industrial group which is 66.39 and 64.91 respectively. After applying 't' test it is clear that there is a significant difference exhale capacity between industrial and non-industrial group because value of calculated 't' (2.67) which is greater than tabulated 't' (2.00) at 0.05 level of significance, which indicates or shows that there is a significant difference in Exhale Capacity between industrial and non-industrial group.



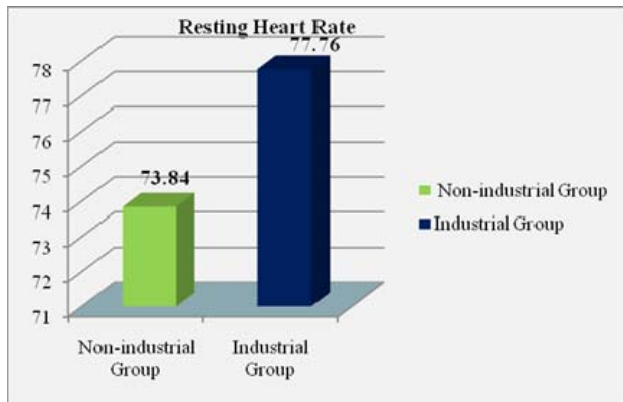
**Graph 2:** Graphical representation of mean difference of exhale Capacity of Non-industrial and industrial group

**Table 3:** Resting Heart Rate between Industrial And Non-Industrial Inhabitants

Group	Mean	S.D.	M.D.	D.F.	O.T.	T.T.
Non-industrial	73.84	5.25	1.08	48	2.38	2.00
Industrial	77.76	6.09				

\*Level of Significance = 0.05  
Tabulated 't' 0.05 (48) = 2.00

Table-3 reveals that there is difference between means of Non-industrial and industrial group, because the mean of Non-industrial is 73.84, greater than Industrial which is 77.76, and their mean difference is 1.08. To check the significant difference of Resting Heart Rate between Non-Industrial and Industrial group the data is analyzed by applying 't' test. Before applying 't' test, standard deviation is calculated between Non-Industrial and Industrial group which is 5.25 and 6.09 respectively. After applying 't' test it is clear that there is a significant difference in Resting Heart Rate between industrial and non-industrial group because value of calculated 't' (2.38) which is greater than tabulated 't' (2.00) at 0.05 level of significance, which indicates or shows that there is a significant difference in Resting Heart Rate between industrial and non-industrial group.



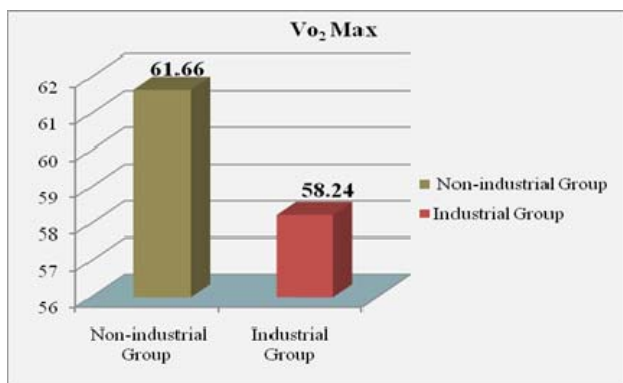
**Graph 3:** Graphical Representation of Mean Difference of Resting Heart Rate of Non –industrial and Industrial group

**Table 4:** Vo<sub>2</sub> Max between Industrial And Non-Industrial Inhabitants

Group	Mean	S.D.	M.D.	D.F.	O.T.	T.T.
Non-industrial	61.66	5.52	3.42	48	2.40	2.00
Industrial	58.24	7.25				

\*Level of Significance = 0.05  
 Tabulated 't' 0.05 (38) = 2.00

Table-4 reveals that there is difference between means of Non-industrial and industrial group, because the mean of Non-industrial is 61.66, less than Industrial which is 58.24, and their mean difference is 3.42. To check the significant difference of Vo<sub>2</sub> Max between Non-Industrial and Industrial group the data is analyzed by applying 't' test. Before applying 't' test, standard deviation is calculated between Non-Industrial and Industrial group which is 5.52 and 7.25 respectively. After applying 't' test there is a significant difference in Vo<sub>2</sub> Max capacity between industrial and non-industrial group because value of calculated 't' (2.40) which is greater than tabulated 't' (2.00) at 0.05 level of significance, which indicates or shows that there is a significant difference in Vo<sub>2</sub> Max. between industrial and non-industrial group.



**Graph 4:** Graphical Representation Of Mean Difference of Vo<sub>2</sub> Max of Non –industrial and Industrial group

**Conclusion**

Within the limitations of the study and from statistical analysis the following conclusion was drawn. There was found significant difference in the cardio respiratory variables of industrial and non-industrial inhabitants of Amravati city. From result of this survey type of study we come to this conclusion that Industrial inhabitants

were found poor in cardio respiratory variables as compared to Non Industrial inhabitants because in all the four selected cardio respiratory variables the industrial group showed poor performance as compared to Non-Industrial group, the reason behind this all might be the affect of industrial pollution as industrial inhabitants comes in direct contact with the pollutants that gets liberated from industries in the form of poisonous gases and chemicals. At last From this study we come this conclusion that industries proves to be very fatal to all the individual residing near to them These industries create lot of health related problems and sometimes they may take the life of whole population. So government should take necessary steps to minimize the effect of industrial pollution so save the human life from destruction.

**Recommendation**

In the light of results obtained and conclusions drawn, the following recommendations are made for future investigations and for practical applications:

1. It is strongly recommended to all the human population that they should not construct their homes near to industries.
2. The government should take necessary steps to minimize the effect of industrial pollution so that human life could be saved from destruction.

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