

Cardiopulmonary Changes Among Road Truck Pushers (Garuwa) In Basawa District, Sabon Gari Local Government Zaria, Kaduna State Of Nigeria

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Citation

B Gayo, D Akor, U Abdulkarim, O Victor. *Cardiopulmonary Changes Among Road Truck Pushers (Garuwa) In Basawa District, Sabon Gari Local Government Zaria, Kaduna State Of Nigeria*. The Internet Journal of Cardiovascular Research. 2008 Volume 6 Number 2.

Abstract

The cardiopulmonary changes among road truck pushers were studied in 200 subjects (100 experimental group and 100 control group). The cardiovascular parameters measured are blood pressure (systolic and diastolic), pulse and mean arterial blood pressure by auscultatory method using stethoscope and sphygmomanometer. The pulmonary parameters measured are peak expiratory flow rate (PEFR), forced expiratory volume in one second (FEV₁) and FEV% by using Wright peak flow meter and vitalograph machine. The cardiopulmonary parameters (systolic and diastolic blood pressure, mean arterial blood pressure, PEFR, FEV₁, FEV% and body mass index) of road truck pushers showed an appreciable significant statistical changes ($p < .05$) when compared to the control group.

INTRODUCTION

Cardiopulmonary function tests are specific measurement of cardiovascular and pulmonary function which is used to assess the degree of functional (9) abnormality due to cardiopulmonary disease. Road truck pushing (Garuwa) is one of the self employed jobs that are booming in northern part of Nigeria, due to scarcity of water. This community earns their living from commercializing pipe bone water by reaching the door-step of those in need of it via pushing 12 to 20 jerry cans (25 litres) of water in truck locally called in Hausa as "Garuwa".

Individuals that engage in this strenuous work use to have a lot of changes in the normal body physiology particularly cardiovascular and pulmonary parameters (8, 12) which manifest immediate or at the later years. Over the past years a variety of studies have shown that exercise induces considerable physiological changes in the immune system. The interaction between exercise stress and the immune system provide a unique opportunity to link basic and clinical physiology and to evaluate the role of underlying stress and (11, 13) immunological mechanism.

Aging is associated with decrease of blood volume and total body water, a proneness to disturbance in water balance, homeostasis impairment while in extreme situations, and

alterations (6, 1) of renal functions perception of thirst and cardiovascular performance. Accordingly, the aim of this investigation was to examine the comprehensive cardiovascular and pulmonary responses to the strenuous work of road truck pushers which may manifest immediately or at the later years. We hypothesized that prolonged strenuous exercise would be associated with decrease in cardiopulmonary functions.

MATERIALS AND METHODS

Materials: The following materials were used for the test; peak flow meter (S48917 Vitalograph Ltd Buckingham, England), weighing scale, measuring tape, sphygmomanometer, stethoscope, stopwatch, spirometer (S48917 Vitalograph Ltd Buckingham, England), cotton wool, disinfectant (methylated spirit) and subjects (100 control group and 100 test group).

Data collection: The study was compiled with the ethical committee guidelines of Ahmadu Bello University Teaching Hospital, Zaria and the procedures followed were in accord with the ethical standards of Ahmadu Bello University, Zaria, Nigeria. The data of 200 male subjects (100 Road Truck pushers and 100 control group) was collected using a questionnaire in Basawa District Sabon Gari local government of Kaduna state, Nigeria. The data collected

from all the subjects with an age range of 20-30 years by random sampling are age (years), weight (kg), height (m), body mass index (BMI), blood pressure (mmHg), pulse pressure (mmHg), heart rate (beat/min), peak expiratory flow rate (PEFR; L/min), mean arterial blood pressure (mmHg), respiratory rate (breath//min), forced vital capacity (L), force expiratory volume (L/sec) and percentage of force expiratory volume.

Climate of the research area; The research was carried out in Zaria with the following climatic conditions:

Statistical Analysis: All data are expressed as Mean \pm S.E.M. The data obtained were analyzed using one way analysis of variance (ANOVA) and Turkey-Kramer post hoc (3) test for multiple comparisons. The ($P<0.05$) will be accepted as significant.

Figure 1

- Mean Annual Rainfall – 1000mm.
- Mean Annual Temperature – 27°C.
- Longitude and Latitude – 11° 3' N, 7° 42' E.
- Height – 670m above sea level and 664km away from the sea.
- Season – dry and wet (10).

RESULTS

The results of cardiopulmonary changes among road truck pushers were analyzed by comparing the mean \pm SEM of control and test group using one way analysis of variance. The blood pressure (systolic and diastolic) and mean arterial pressure of test group decreased significantly ($P<0.05$) when compare to control group, while pulse pressure decrease was not significantly. The heart rate in test group increased significantly ($P<0.05$) when compare to control group. The peak expiratory flow rate (PEFR) decreased significantly ($P<0.05$) when compare to control group, while forced expiratory volume (FEV_1) and percentage ($FEV_1\%$) increased significantly ($P<0.05$) when compare to control group. As regard to forced vital capacity (FVC) and respiratory rate there was no statistical significance in decrease when compare to control group.

Figure 2

Fig 1. Anthropometric parameters among road truck pushers (Garuwa) in Basawa district of Sabon Gari local Government Zaria, Kaduna state Nigeria.

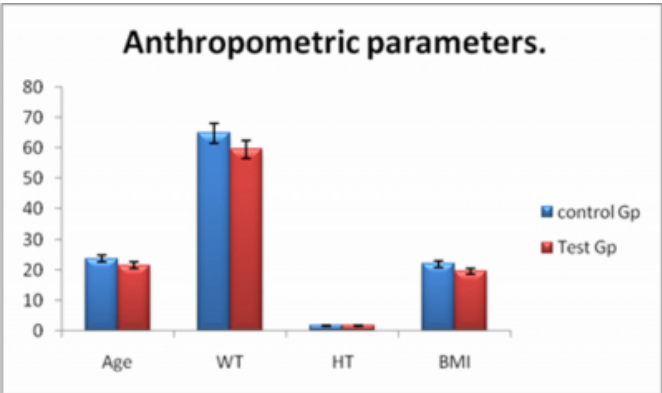


Figure 3

Fig 2. Cardiovascular parameters among road truck pushers (Garuwa) in Basawa district of Sabon Gari local Government Zaria, Kaduna state Nigeria.

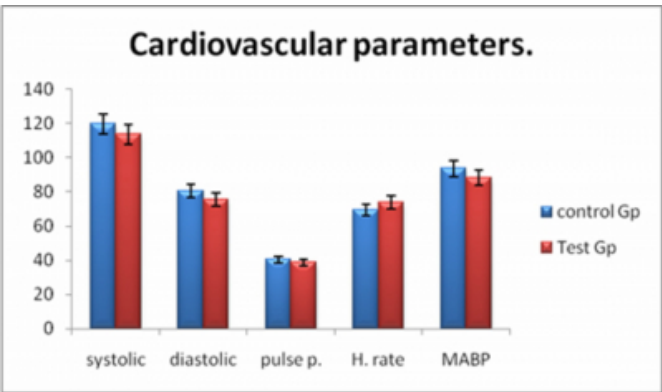


Figure 4

Fig 3. Pulmonary parameters among road truck pushers (Garuwa) in Basawa district of Sabon Gari local Government Zaria, Kaduna state Nigeria.

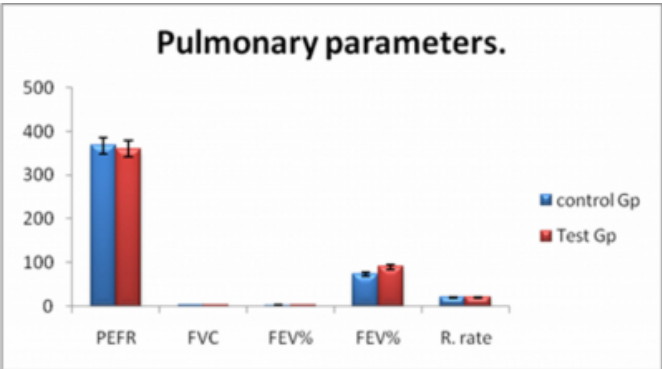


Figure 5

Table 1. Mean \pm SEM of cardiopulmonary and anthropometric parameters among road truck pushers (Garuwa) in Basawa district of Sabon Gari local Government Zaria, Kaduna state Nigeria.

S/No	Parameters	Control group	Experimental group
1	Age (yrs)	23.72 \pm 0.3	21.44 \pm 0.4 ^{NS}
2	Weight (kg)	64.82 \pm 1.1	59.53 \pm 0.8 ^S
3	Height (m)	1.7 \pm 0.001	1.7 \pm 0.001 ^{NS}
4	BMI (kg/m ²)	21.92 \pm 0.4	19.59 \pm 0.3 ^S
5	Systolic BP (mmHg)	119.6 \pm 1.2	113.5 \pm 1.4 ^S
6	Diastolic BP (mmHg)	80.49 \pm 1.4	75.39 \pm 1.5 ^S
7	Pulse Pressure (mmHg)	40.43 \pm 1.2	38.79 \pm 1.8 ^{NS}
8	Heart rate beat/min	69.44 \pm 1.0	73.84 \pm 1.2 ^S
9	MABP (mmHg)	93.70 \pm 1.2	88.44 \pm 0.8 ^S
10	PEFR (L/min)	368.1 \pm 6.0	360.4 \pm 7.5 ^S
11	FVC (L)	3.40 \pm 0.1	3.38 \pm 0.1 ^{NS}
12	FEV ₁ (L/sec)	2.57 \pm 0.1	3.07 \pm 0.1 ^S
13	FEV ₁ %	73.66 \pm 1.4	90.01 \pm 1.0 ^S
14	Respiratory rate breath/min	20.31 \pm 0.6	20.80 \pm 0.4 ^{NS}

NS=Not significant; S=Significant (P<0.05).

DISCUSSION

The results of the present study reported that, the cardiopulmonary changes among road truck pushers showed a significant statistical difference when compared to control group. This is in consonance with (5, 16, 17) that prolonged strenuous exercise may lead to decrease in cardiac functions or desensitization of receptors through down regulation or uncoupling. Several authors have postulated that myocardial damage may (14, 4) occur as the result of prolonged strenuous exercise. The blood pressure (systolic and diastolic) and mean arterial pressure of test group decreased significantly when compare to control group, while pulse pressure decrease was not significantly. The heart rate in test group increased significantly (P<0.05) when compare to control group. During strenuous exercise sympathetic discharge is maximal and parasympathetic stimulation is withdrawn resulting in vasoconstriction in most of the circulatory body systems except in exercising muscle, cerebral and coronary (8) circulation. The peak expiratory flow rate (PEFR) decreased significantly (P<0.05) when compare to control group, while forced expiratory volume (FEV₁) and percentage (FEV₁%) increased significantly (P<0.05) when compare to control group. Oxygen uptake quickly increases when dynamic exercise commences. Maximum oxygen uptake can be influenced by age, sex, and exercise habit, hereditary and cardiovascular (2, 15) clinical status. As regard to forced vital capacity (FVC) and respiratory rate there was no statistical significance in decrease when compare to control group. The weight and body mass index also decreased significantly. The result showed that there is an appreciable change in cardiopulmonary parameters in road truck pushers which may lead to decrease in cardiac functions or pulmonary

disease.

ACKNOWLEDGEMENT

The authors are grateful to the following; All the technical staff in the Department of Human physiology Ahmadu Bello University, Zaria for the role they played in the laboratory during this research particularly Mr Ola Bambe and Mr J.E.Toryila. We also acknowledge University Board of Research of Ahmadu Bello University, Zaria for supporting this research work.

References

1. Arena R, Myers J, Williams MA, Gulati M, Kligfield P, Balady E, Collins E, Fletcher G. Assessment of functional capacity in clinical and research settings: American Heart Association committee on exercise rehabilitation and prevention of cancer on clinical cardiology. 2007; 116: 329-343.
2. Azenabor AA, Hoffman A. Intrathymic and intrasplenic oxidative stress mediates thymocyte and splenocytes damage in acute exercised mice. J Appl. Physiol. 1999; 86:1823-1827.
3. Betty RK, Jonathan AC. Essential medical statistics. Second edition. Blackwell science USA, 2003; pp. 15-409.
4. Dawson E. George K. Shave R. Whyte G. Ball D. Does the human heart fatigue subsequent to prolonged exercise? Sports Med. 2003; 33:365-380.
5. Emma H. Ellen D. Peter R. Keith G. Niels HS. Greg W. Rob S. β -Adrenergic receptor desensitization in man: insight into post-exercise attenuation of cardiac function. J Physiol. 2006; 577(2): 717-725.
6. Fley TJ, Cornor FO, Gersteubli G, Becker LC, Clulow J, Schulmen SP, Lakaffa EG. Impact of age in the cardiovascular response to dynamic upright exercise in healthy men and women. J Appl. Physiol. 1995; 78:890-900.
7. Friedrick J, De serres S. Global initiative for chronic obstructive pulmonary disease. American journal of epidemiology, 2002; 14:156-162.
8. Gerald FF, Charr MA, Gary J, Balady MA, Vicecharr EA, Amefedran MD, Bernard C, Robert E, Jerome F, Victor FF, Arthur SL, Heanat P, Roxmne R, Denis A, Simons M, Mark AW, Terry B. Exercise standard for testing and training. A statement of health care professional from American Heart Association; 2001.
9. Madama VC. Pulmonary function testing and cardiopulmonary stress testing. Second edition, Delmar publishers, USA. 1998; pp.151-214.
10. Marthins MI. Zaria and its region. Department of Geography Ahmadu Bello University, Zaria, 2006; pp-41.
11. Pedersen BK, Akeratrom TCA, Nielson AR, Fisher CP. Role of myokines in exercise and metabolism. J. Appl. Physiol, 2007; 103: 1093-1098.
12. Rabe K. Treating chronic obstructive pulmonary diseases, New Engl J Med. 2007; 258:651.
13. Robert CW, Darren ER, Warburton DPH, Dylan AT, Jonathon MG, Mark JH. Prolonged strenuous exercise alters the cardiovascular response to dobutamine stimulation in male athletes. J Physiol. 2005; 569(1): 325-330.
14. Rowe WJ. Extraordinary unremitting endurance exercise and permanent injury to normal heart. Lancet. 1992; 340:712-714.
15. Seals DR, Rogers MA, Hagberg JM, Yamamoto C, Cryer PE. Ehsani AA. Left ventricular dysfunction after

prolonged strenuous exercise in healthy subjects. Am J Cardiol. 1988; 61:875–879.

16. Warburton DE, Welsh RC, Haykowsky MJ, Taylor DA, Humen DP. Biochemical changes as a result of prolonged

strenuous exercise. Br J Sports Med. 2002; 36:301–303.

17. Whyte GP, George K, Sharma S, Lumley S, Gates P, Prasad K, McKenna WJ. Cardiac fatigue following prolonged endurance exercise of differing distances. Med Sci Sports Exerc. 2000; 32:1067–1072.

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