Evaluation of Lung Function Test in Zumba Dancers

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Authors’ contributions

This work was carried out in collaboration among all authors. Author PM Literature collection of the manuscript. Author SP framing the manuscript, statistics approval of the manuscript. Authors GS and LP final approval of the manuscript.

ABSTRACT

Introduction: Exercise is very important in each and every individual’s life. Zumba exercise is a form of physical exercise that combines all the exercise which is beneficial for the body. The aim of the study is to evaluate the effect of zumba exercise training on pulmonary function tests in individuals.

Materials and Methods: This study was carried out among 60 individuals where 30 people belonged to a normal group and 30 people were zumba dancers. The values were recorded through a computerised spirometer. This study was done among zumba dancers in the Chennai region. The results were analysed using SPSS software. unpaired T test was used to analyse the statistical significance. p<0.05 was considered significant.

Results: The mean values of the lung function test for FVC, FEV1 and FEV1/FVC ratios were 3.73, 2.88 and 82.33% respectively and all the values were statistically not significant.

Conclusion: The study showed that pulmonary function tests in zumba dancers were good when compared to the control group.
1. INTRODUCTION

Physical activity and a healthy mind is known to improve physical fitness and good health. Zumba exercise is an important exercise that improves physical fitness which reduces chronic diseases [1]. This physical activity improves muscle strength and boosts your endurance. It helps to maintain good health.

Pulmonary functions tests are a group of tests that measure how well your lungs work [2]. It measures how much lungs can take up the oxygen from the air. Spirometry is the basic test for lung function. The Average lung capacity is 6 Litres. The normal PFT value in FVC is 80% to 120%. People who do zumba have more lung capacity compared to the control group. This test is essential for diagnosing and assessing severity of many pulmonary disorders. Spirometry helps to diagnose breathing problems such as asthma and COPD [3]. Tests of pulmonary function Lung volume, lung capacity, rate of flow, and gas exchange are all measured using non-invasive techniques. PFT can be measured by a mouthpiece attached to a small electronic machine. It gives the perfect values of FVC, FEV and FEV1/FVC [4].

Zumba dance is a type of physical exercise which helps in physical fitness and good health. There are various types of zumba dances that integrate weights for calorie burning and strength training, such as aqua zumba, zumba toning, and so on [4,5]. It contributes to significant improvement in body zumba dance and has become a popular form of exercise among women. Dancing is a fun and interactive form of exercise that improves the attitude towards the exercise [6]. Zumba dance is a fantastic method to lose weight and build muscles. It can aid in the prevention of heart disease, the reduction of blood pressure and bad cholesterol, and the increase of energy [7]. Exercise plays an important role in each person's life and leads to a happy and healthy life. Our team has a wealth of research and knowledge that has resulted in high-quality publications [6-25]. Therefore, this study was done to assess the lung function test in zumba dancers.

2. MATERIALS AND METHODS

This study was carried out among 60 individuals which involved zumba dancers (30) cases and control group (30) cases. Individuals are between the ages of 17-40 years. This test is performed with a computerised spirometer. Before the test, the subjects were given instructions. After a deep inspiration, the subjects were instructed to block their nose and the air expired with a maximum force into the device. Later the values are calculated and graphs are made with standard deviation. Spirometer is an electronic device which detects the parameters such as FVC, FEV1 and FEV1/FVC and the p-value. The statistic followed in this study is t-test.

2.1 Inclusion Criteria

1. Subjects between the age 17-40 years of any gender.
2. For control groups, it includes non-smokers, non-alcoholic, non-asthmatic and individuals who are not undergoing any type of physical activity.
3. Subjects undergoing zumba practice of experience for 3 months.

2.2 Exclusion Criteria

1. Subjects who are above 40 years.
2. Zumba dancers who have a history of asthma, COPD, Smokers, alcoholic.

2.3 Statistical Analysis

The data was analysed using SPSS software. Independent t-test was done to analyse the significance. P value less than 0.05 was considered significant.

3. RESULTS

The mean values of lung function tests in zumba dancers were recorded. The mean values of the parameters are FVC-4.30, FEV1-3.34 and FEV1/FVC-78.23% (Figs. 1-3). The mean values of FVC, FEV1 and FEV1/FVC are not statistically significant because (p= 0.908), (p= 0.560) and (p= 0.363) respectively which is greater than 0.05. Table 1 shows the significance between the zumba dancers and the normal people.

In the present study, we found the lung function test on zumba dancers. There was a significant increase in both the values of FVC, FEV1 [26]. Other studies have reported similar improvement in lung function on aerobics practitioners which was done by Singh et al. [27].
Table 1. This table shows the significance in the zumba dancers and control group. In this study there was a significant difference in FEV1/FVC compared to the control group (p<0.05)

| Parameters     | Control Group | Zumba Dancers | Significance |
|----------------|---------------|---------------|--------------|
| FVC            | 3.17          | 4.30          | 0.908        |
| FEV1           | 2.42          | 3.34          | 0.560        |
| FEV1/FVC(%)    | 86.43         | 78.23         | 0.363        |

Fig. 1. The bar shows the Forced Vital Capacity (FVC) of zumba dancers and control group. X-axis represents the control and study groups and Y-axis represents the mean value of FVC. The red colour denotes the control group and the green colour denotes the zumba dancers. Zumba dancers have greater FVC value compared to the control group. Unpaired t-test was done, the p-value is 0.908 (p>0.05) and it was found to be statistically not significant.

Fig. 2. The bar shows the forced expiratory volume (FEV1) of zumba dancers and control group. X-axis represents the control and study groups which are compared and Y-axis represents the mean value of FEV1. The red colour denotes the control group and the green colour denotes the zumba dancers. Zumba dancers have greater value of FEV1 compared to control groups. The unpaired t-test was performed and found to be statistically insignificant, p-value is 0.560 (p>0.05)
4. DISCUSSION

In the context, we studied the effects of zumba on respiratory parameters like FVC, FEV and FEV1/FVC in the result found that both the parameters are highly significant. Other studies have also reported similar improvement in lung function tests in athletes, aerobic exercise, pulmonary fibrosis patients, etc [28]. This study showed that the lung function test in Zumba dancers is more significant than compared to the control group. Other related studies include moderate intensity Aerobic training improves pulmonary function in young Indian men [29,30]. This data was analysed by t test. There was no significant change in FEV1/FVC Ratio and not serious adverse events during the study. There is a significant positive relationship between aerobic training and pulmonary function in healthy young men.

Athletes had greater FVC, FRV and FEV1/FVC ratios than normal sedentary control subjects. Regular exercise, according to this study, has a vital role in determining and enhancing lung function [10,15]. Standard test for lung volumes at real oxygen tension gas exchange at rest and during cycling showed a reduced total and capacity [31]. Non-influencing factors were gender, parameters of gas exchange at rest. The limitation of the study includes less number of study participants and control groups.

5. CONCLUSION

The study showed that the pulmonary function test in zumba dancers was good when compared to the control group. Thus the present study showed that the zumba dance has a positive effect on lung function.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Vendramin B, Bergamin M, Gobbo S, Cugusi L, Duregon F, Bullo V, Zaccaria M, Neunhaeuserer D, Ermolao A. Health benefits of Zumba fitness training: a systematic review. PM&R. 2016;8(12):1181-200. Ranu H, Wilde M, Madden B. Pulmonary function tests. Ulster Med J. 2011;80(2):84–90.
2. Heckman EJ, O’Connor GT. Pulmonary function tests for diagnosing lung disease. JAMA. 2015;313(22):2278–9.
3. Harms CA, Wetter TJ, St Croix CM, Pegelow DF, Dempsey JA. Effects of respiratory muscle work on exercise performance. J Appl Physiol. 2000;89(1):131–8.
4. De AK, Dasgupta PK, Panda BK, Bhattacharya AK. Physical efficiency tests on Indian male “Kabaddi” inter-university players [Internet]. Vol. 16, British Journal of Sports Medicine. 1982:33. Available: http://dx.doi.org/10.1136/bjsm.16.1.33
5. Munis JR. Pulmonary Function Tests [Internet]. Just Enough Physiology. 2011:108–21. Available: http://dx.doi.org/10.1093/med/9780199797790.003.0014
6. Jitesh S, Devi G. Effect of zumba dance on blood pressure. Journal of Pharmaceutical Sciences and Research. 2016;8(6):501.
7. Saraswathi I, Saikarthik J, Senthil Kumar K, Madhan Srinivasan K, Ardhanaaari M, Gunapriya R. Impact of COVID-19 outbreak on the mental health status of undergraduate medical students in a COVID-19 treating medical college: A prospective longitudinal study. PeerJ. 2020;8:e10164.
8. Santhakumar P, Roy A, Mohanraj KG, Jayaraman S, Durairaj R. Ethanolic extract of capparis decidua fruit ameliorates methotrexate-induced hepatotoxicity by activating Nrf2/HD-1 and PPARγ mediated pathways. Ind J Pharm Educ. 2021;55(1s):s265–74.
9. Nambi G, Kamal W, Es S, Joshi S, Trivedi P. Spinal manipulation plus laser therapy versus laser therapy alone in the treatment of chronic non-specific low back pain: A randomized controlled study. Eur J PhysRehabil Med. 2018;54(6):880–9.
10. Rajakurni R, Volova T, Oluwafemi OS, Rajesh Kumar S, Thomas S, Kalarikkal N. Grape seed extract-soluplus dispersion and its antioxidant activity. Drug Dev Ind Pharm. 2020;46(8):1219–29.
11. Clarizia G, Bernardo P. Diverse applications of organic-inorganic nanocomposites: Emerging research and opportunities: Emerging research and opportunities. IGI Global. 2019:237.
12. Prakash AKS, Devaraj E. Cytotoxic potentials of S. cumini methanolic seed kernel extract in human hepatoma HepG2 cells [Internet]. Environmental Toxicology. 2019;34:1313–9. Available: http://dx.doi.org/10.1002/tox.22832
13. Tahmasebi S, Qasim MT, Krivenkova MV, Zekiy AO, Thangavelu L, Aravindhan S, et al. The effects of oxygen-ozone therapy on regulatory T-cell responses in multiple sclerosis patients. Cell Biol Int. 2021;45(7):1498–509.
14. Wadhwa R, Paudel KR, Chin LH, Hon CM, Madheswaran T, Gupta G, et al. Anti-inflammatory and anticancer activities of Naringenin-loaded liquid crystalline nanoparticles in vitro. J Food Biochem. 2021;45(1):e13572.
15. Vivekanandhan K, Shanmugam P, Barabadi H, Arumugam V, Daniel Raj Daniel Paul Raj D, Sivasubramanian M, et al. Emerging therapeutic approaches to combat COVID-19: Present status and future perspectives. Front MolBiosci. 2021;8:604447.
16. Ezhilarasani D. Critical role of estrogen in the progression of chronic liver diseases. Hepatobiliary Pancreat Dis Int. 2020;19(5):429–34.
17. Egbuna C, Mishra AP, Goyal MR. Preparation of Phytopharmaceuticals for the management of disorders: The development of nutraceuticals and traditional medicine. Academic Press. 2020:574.
18. Kamath SM, Manjunath Kamath S, Jaison D, Rao SK, Sridhar K, Kasthuri N, et al. In vitro augmentation of chondrogenesis by Epigallocatechin gallate in primary Human chondrocytes - Sustained release model for cartilage regeneration [Internet]. Journal of Drug Delivery Science and Technology. 2020;60:101992. Available: http://dx.doi.org/10.1016/j.jddst.2020.101992.
19. Barabadi H, Mojtaba F, Vahidi H, Marashi B, Talank N, Hosseini O, et al. Green synthesis, characterization, antibacterial and biofilm inhibitory activity of silver nanoparticles compared to commercial silver nanoparticles [Internet]. Inorganic Chemistry Communications. 2021;129:108647. Available: http://dx.doi.org/10.1016/j.inoche.2021.108647

20. Gowhari Shabgha A, Ezzatifar F, Aravindhan S, Olegovna Zekiy A, Ahmadi M, Gheibihayat SM, et al. Shedding more light on the role of Mtdkine in hepatocellular carcinoma: New perspectives on diagnosis and therapy. IUBMB Life. 2021;73(4):659–69.

21. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. J Oral Pathol Med. 2019;48(4):299–306.

22. R H, Hannah R, Ramani P, Ramanathan A, Jancy MR, Gheena S, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene [Internet]. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology. 2020;130:306–12. Available: http://dx.doi.org/10.1016/j.oooo.2020.06.021

23. PC J, Pradeep CJ, Marimuthu T, Krithika C, Devadoss P, Kumar SM. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study [Internet]. Vol. 20. Clinical Implant Dentistry and Related Research. 2018;531–4. Available: http://dx.doi.org/10.1111/cid.12609

24. Wahab PUA, Abdul Wahab PU, Madhulaxmi M, Senthilnathan P, Muthusekar MR, Vohra Y, et al. Scalpel versus diathermy in wound healing after mucosal incisions: A split-mouth study [Internet]. Journal of Oral and Maxillofacial Surgery. 2018;76:1160–4.

Available: http://dx.doi.org/10.1016/j.joms.2017.12.020

25. Mudigonda SK, Murugan S, Velavan K, Thulasiraman S, Krishna Kumar Raja VB. Non-suturing microvascular anastomosis in maxillofacial reconstruction- a comparative study. Journal of Cranio-Maxillofacial Surgery. 2020;48(6):599–606.

26. Meyer MW, Robinson JM. The nag hammadi scriptures: The revised and updated translation of sacred gnostic texts complete in one volume. Harper Collins. 2010:864.

27. Singh M, Dureha DK, Yaduvanshi S, Mishra P. Effect of aerobic and anaerobic exercise on basal metabolic-rate [Internet]. British Journal of Sports Medicine. 2010;44:i26–i26.

28. Li X, Yu R, Wang P, Wang A, Huang H. Effects of exercise training on cardiopulmonary function and quality of life in elderly patients with pulmonary fibrosis: A meta-analysis. International Journal of Environmental Research and Public Health. 2021;18(14):7643.

29. Hagberg JM, Yerg JE, Seals DR. Pulmonary function in young and older athletes and untrained men [Internet]. Journal of Applied Physiology. 1988;65:101–5. Available: http://dx.doi.org/10.1152/jappl.1988.65.11.101

30. Wojciechowska-Maszkowska B, Marcinow R, Iskra J, Tataruch R. Postural stability in athletes during special hurdle tests without a definite dominant leg. Int J Environ Res Public Health [Internet]. 2020;29;18(1). Available: http://dx.doi.org/10.3390/ijerph18010172

31. Grisbrook TL, Wallman KE, Elliott CM, Wood FM, Edgar DW, Reid SL. The effect of exercise training on pulmonary function and aerobic capacity in adults with burn [Internet]. Burns. 2012;38:607–13. Available: http://dx.doi.org/10.1016/j.burns.2011.11.004

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