

Respiratory Mechanics During Exercise

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Purpose: We tested changes in volume, pressure and work of breathing in order to understand breathing mechanics at rest and during exercises. **Methods:** We recruited 20 males for the study. They were divided according to physical activity questionnaires into sedentary and physically active groups. The specific variables related to mechanics of breathing including force (pressure) generated by respiratory muscles, compliance of lung tissues, chest wall and total respiratory system were simultaneously investigated. Dynamic changes of intra-thoracic pressure during breathing cycle, ventilation needed at higher metabolic condition were studied. **Results:** According to pressure-volume relationships, static compliance remains the same in both sedentary and physically active subjects. This implies the similar respiratory muscle strength and elastic works at any lung volume during exercise. At 40 and 60% of $VO_2\max$, elastic work of total respiratory system in active group was far greater than that of sedentary subjects ($p < 0.05$). With limitations of dynamic works estimations, the present study found higher averaged inspiratory and expiratory flows at 40% $VO_2\max$ was significantly greater in physically active than sedentary subjects ($p < 0.05$). Active-lifestyle subjects improve ventilation via increasing in tidal volumes whilst lowering breathing frequencies. **Conclusion:** During exercise, those with sedentary lifestyle showed limitation in dynamic flow-volume loop at higher lung volume than physically active subjects. This mechanism is involuntarily compensated in order to avoid high airways resistance generally found at lower lung volume. During exercise, 3 types of respiratory work, which critically impedes ventilation including elastic (static), flow-resistive (dynamic deformation of airways and lung tissues) and inertial work, showed remarkably increase.