MAYO CLINIC

Cardiovascular Benefits of Group Sport Interventions: Importance of Improved Fitness in Risk Reduction

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Available evidence suggests the implementation of recreational group sports as an additional strategy in the prevention of cardiovascular disease events, with potential for broad public health impact.[1-3] A previous review and meta-analysis evaluating the health benefits of specific sport disciplines suggested that both running and soccer can improve cardiorespiratory fitness (CRF) and cardiovascular function.[1] The authors concluded that there is some conditional research evidence on benefits of running for cardiometabolic fitness parameters, body composition, and postural balance, and group sports such as soccer improve cardiometabolic fitness, muscular performance, balance, and cardiac function; however, there is less evidence from randomized controlled trials (RCTs) on health benefits of other sport disciplines.[1] In this issue of *Mayo Clinic Proceedings*, Bellissimo et al[2] provide new interesting evidence of the cardiovascular health benefits of group sports in a systematic review and meta-analysis from available intervention studies.

Previous research data have supported aerobic exercise training as an essential means to improve lipid profile and reduce blood pressure and body weight. However, high-intensity interval training (HIIT) is increasingly recognized as another common exercise mode to improve fitness and cardiovascular risk factor profile. Current evidence suggests that HIIT may increase maximum oxygen consumption ($\dot{V}O_{2max}$) and improve cardiometabolic risk factors including blood pressure and lipid levels.[3] Physical activity with HIIT is an effective way of increasing $\dot{V}O_{2max}$ and improving risk profile, compared with moderate-intensity continuous training (MICT).[4] Intensive group sports could offer an alternative to traditional individual aerobic exercise options by including components of high-intensity exercise in the group with supportive emotional aspects, thereby leading to increased commitment for regular physical activity by participants of distinct ages, sex, and initial fitness levels. The positive socializing effects of physical activity in a group are benefits and incentives that may be emphasized by health care professionals in motivating patients toward regular exercise training. Exercising in a group, such as dancing, tai chi chuan, and yoga, has been reported to be beneficial in improving cardiovascular health.[5,6] These recreational group exercise strategies might provide useful intervention for improving CRF and reducing cardiovascular risk associated with aging; for example, dancing is an activity that is as effective as other types of exercise modes in improving CRF ($\dot{V}O_{2max}$) in the elderly.[5]

As an objective measure, the assessment of CRF has achieved considerable clinical merit and is considered to be a vital sign in patient risk assessment.[7] This growing body of evidence should be a stimulus for all health care professionals to incorporate CRF improvement as a high priority in the overall clinical treatment approach to patients with chronic diseases. Although aerobic training is primarily associated with improvements in CRF level, there is some evidence that combined training with both resistance and aerobic exercise training (HIIT, MICT) components would be an effective strategy leading to positive changes in body composition, muscle strength, and CRF. A recent RCT found that a combination of aerobic and strength training was the most efficient modality for improving functional status among overweight patients.[8] This RCT suggested that weight loss plus combined aerobic and resistance training provided greater improvement in physical function and reduction of frailty than either intervention alone and was associated with preservation of lean mass and muscle power.[8]

Cardiorespiratory fitness is related to the ability to transport oxygen from the lung to the mitochondria in exercising tissues, and the cardiovascular benefits of physical activity seem to be largely mediated by favorable modulation of CRF. Habitual exercise training produces many biological adaptations that improve CRF; such improvement may be effected by regular rhythmic contractions of large muscle groups continuously for a longer period of time at a moderate to vigorous intensity or with recovery breaks at lower intensity when the exercise period is aimed at achieving high to vigorous effort such as HIIT interventions.[7] The level of CRF has been related to various characteristics, such as age, sex, heredity, body composition, and quantity and quality of physical activity.[7,9] As an objective measure, CRF is associated with the integration of human body function under physiologic stress conditions, and it quantifies the functional capacity of an individual, reflecting body function and general health. The relationship between the intensity and total amount physical activity and CRF has been relatively weak, and physical activity level accounts for a part of the variance of $\dot{V}O_{2max}$.[7,9] In addition to other determinants of $\dot{V}O_{2max}$, it is suggested that around half of the variance in CRF is attributable to heritable factors; similarly, the contribution of inherited factors to the response of CRF to aerobic or interval training approximates 45% to 50%.[7]

In their meta-analysis, Belissimo et al[2] showed significant cardiometabolic and $\dot{V}O_{2max}$ improvements following regular group sport participation. They reported that group sport participation, primarily recreational soccer, was associated with clinically important improvements in body composition, lipid profile, and CRF with decreased blood pressure levels.[2] Available evidence indicates that HIIT modalities, including soccer and other group sports, are not only highly efficacious but also relatively safe, with low risk of injuries and engaging interventions for cardiometabolic risk reduction even in patients with hypertension or type 2 diabetes.[2,4] With regard to the duration of a single exercise training, a commonly used HIIT session is shorter compared with a group sports event (<30 minutes vs 1 hour). However, there has been no direct comparison of group sports and typical HIIT interventions with cardiovascular health effects.[4]

The authors acknowledged some limitation with regard to published evidence on group sports and cardiovascular benefits.[2] Indeed, it would be beneficial to investigate a broader range of outdoor and indoor group sports interventions, including such group sports such as volleyball, basketball, rugby, and field or ice hockey. Future studies should be conducted to compare outdoor and indoor group sports to aerobic MICT interventions (eg, running, cross-country skiing, cycling) and/or in combination with healthy diet and weight loss. In the recent meta-analysis,[2] most of the included studies were based on soccer as the sport intervention, which may not represent all other potentially healthy group sports including many kinds of dance activities, tai chi chuan, and yoga training.

It is essential to maintain good CRF levels over the long term to improve health outcomes. In a previous prospective study,[9] my collagues and I found that a smaller decrease or increase in $\dot{V}O_{2max}$ over a decade was associated with a lower risk of all-cause death, although CRF tends to decrease with age. To break down barriers and to promote a positive attitude toward continuous long-term activity level with the help of various intensity exercise training modes and group sports, we need to find enjoyable activities for the general population such as recreational group sports,[2] tai chi chuan,[6] and sauna bathing,[10] which may be combined with common resistance and aerobic exercise training modes. These physical activities with social and agreeable aspects are warmly welcome. With proper orientation, soccer, dance, aerobics, tai chi chuan, and yoga activities can be easily performed by older individuals.

In conclusion, high-quality research work is certainly needed to determine if decreased cardiovascular disease and all-cause mortality rates can be achieved by incorporating regular recreational group sports as a component of a patient's lifestyle and following the widely acknowledged recommendations for physical activity.

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REFERENCES

1. Oja P, Titze S, Kokko S, et al. Health benefits of different sport disciplines for adults: systematic review of observational and intervention studies with meta-analysis. *Br J Sports Med*. 2015; 49(7):434-440.
2. Bellissimo MP, Galaviz KI, Paskert MC, Lobelo F. Cardiometabolic risk reduction through recreational group sport interventions in adults: a systematic review and meta-analysis. *Mayo Clin Proc*. 2018;93(10):1375-1396.
3. Batacan RB Jr, Duncan MJ, Dalbo VJ, Tucker PS, Fenning AS. Effects of high-intensity interval training on cardiometabolic health: a systematic review and meta-analysis of intervention studies. *Br J Sports Med*. 2017;51(6):494-503.
4. Karlsen T, Aamot IL, Haykowsky M, Rognmo Ø. High intensity interval training for maximizing health outcomes. *Prog Cardiovasc Dis*. 2017;60(1):67-77.
5. Rodrigues-Krause J, Farinha JB, Krause M, Reischak-Oliveira Á. Effects of dance interventions on cardiovascular risk with ageing: systematic review and meta-analysis. *Complement Ther Med*. 2016;29:16-28.
6. Nery RM, Zanini M, de Lima JB, Bühler RP, da Silveira AD, Stein R. Tai Chi Chuan improves functional capacity after myocardial infarction: a randomized clinical trial. *Am Heart J*. 2015;169(6):854-860.
7. Ross R, Blair SN, Arena R, et al; American Heart Association Physical Activity Committee of the Council on Lifestyle and Cardiometabolic Health; Council on Clinical Cardiology; Council on Epidemiology and Prevention; Council on Cardiovascular and Stroke Nursing; Council on Functional Genomics and Translational Biology; Stroke Council. Importance of assessing cardiorespiratory fitness in clinical practice: a case for fitness as a clinical vital sign; a scientific statement from the American Heart Association. *Circulation*. 2016;134(24):e653-e699.
8. Villareal DT, Aguirre L, Gurney AB, et al. Aerobic or resistance exercise, or both, in dieting obese older adults. *N Engl J Med*. 2017;376(20):1943-1955.
9. Laukkanen JA, Zaccardi F, Khan H, Kurl S, Jae SY, Rauramaa R. Long-term change in cardiorespiratory fitness and all-cause mortality: a population-based follow-up study. *Mayo Clin Proc*. 2016;91(9):1183-1188.
10. Laukkanen JA, Laukkanen T, Kunutsor SK. Cardiovascular and other health benefits of sauna bathing: a review of the evidence. *Mayo Clin Proc*. 2018;93(8):1111-1121.