



How Much Exercise Is Too Much

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Exercise is a major component of a healthy lifestyle, and the benefits of regular physical activity are well established. However physical activity sometimes is accompanied by certain arrhythmias – premature beats or atrial fibrillation (AF). Less often such activity may result in life-threatening arrhythmias – specifically ventricular fibrillation.¹ The relationship between physical activity and risks of AF continues to be a subject of scientific debate. Sub sole nihil novi (lat.) – in a broad sense, it would be wrong characteristics of the article by Nielsen et al. (published in this issue of JAFIB). In fact, numerous studies have been conducted regarding (AF) occurrence and risks in healthy people or in people with undefined health status in statistically meaningful groups. Large-scale meta-analysis of long-term studies and remarkable comparative insights highlight an ambiguity of AF behavior in different groups of individuals (adults, athletes and non-athletes) with their different intensity levels of physical activity. Authors have revealed that both long-term vigorous physical training as well as a lack of physical activity are related to increased risk of AF. Their discrete hint on the presence of U-shaped relationship between physical activity and risks of outbreak of AF is very important for comprehension of AF. Conclusions in fact elegantly reflect true reality emphasizing that we deal with volatile and heterogeneous nature of AF. At large, irrespective of the intensity of physical activity, the new onset of AF paroxysm is unpredictable. Deductively, the results of this remarkable study reveal the presence of individual cardiac/atrial exercise tolerance or individual sensitivity to physical stress. In other words, there

probably is some individual stress level threshold above which the risk of AF paroxysm in a specific lifetime may culminate.

The hypothetical scientific background predisposes that there is a connection between physical activity and AF.² Recently some investigators (including those cited by Nielsen et al. in their original article) hypothesized that regular physical activity, possibly acting through reductions in blood pressure and body mass index, would reduce the risk of incident atrial fibrillation in women.³ Initially these researchers found out that in middle-aged women, physical activity was associated with a modestly reduced risk of AF, however, this relationship was no longer significant after controlling for body mass index. The reasons for increased risk of atrial arrhythmias in middle aged endurance athletes (healthy men, aged 35-59 years) can only be speculated.⁴ Some authors⁵ showed that among adults (> 65 years of age) light to moderate physical activity, particularly leisure-time activity and walking, are associated with significantly lower AF incidence. Latest vast survey of the literature data by Muller-Riemenschneider et al.⁶ demonstrate the controversy in any relationship between these two entities; the overall quality of evidence indicating increases in risk of AF is low and most reports of large increases in risk appear to be substantially overestimated. Obviously, the abovementioned sources suggest that there are some discrepancies in the available data about whether physical activity in specific cohort is harmful or not. In light of the public importance of regular physical activity, contradictory recommendations concerning the

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participation in physical activity should be considered cautiously before more rigorous studies have investigated this issue.⁶ Similarly, Nielsen et al. kindly invite the results of these meta-analyses to be interpreted cautiously. Such a discrete conclusion is of great importance.

There is some uncertainty and even turmoil in the explanation of AF genesis and its overall regularity, incipency, maintenance, self-termination etc. An increasing number of reports suggest that ischemia, i.e. reduction of coronary blood flow, may significantly influence the genesis of AF.⁷⁻⁹ Various organs or major organ systems demonstrate their own response to ischemia and to physical stress. The human heart with its structural and functional peculiarities is an exceptionally unique anatomic unit. Complex regulating system (automaticity, influence of central nervous system and autonomic tone, neurohumoral regulation etc.) can produce important and rapid cardio-circulatory changes in response to physical stress and to ischemic abnormalities. Vigorous or moderate physical stress along with suffocated atria may be involved in the creation of arrhythmogenic substrate releasing AF drivers or any kind of arrhythmias. Vigorous exertion per se may be treated as a proarrhythmic contributory factor but individual tolerance may demonstrate some resistance to the provocative physical factor. With aging and with coronary blood flow reduction the tolerance of every kind of overstress as well as physical endurance tend to attenuate. Nevertheless, further systematic analysis might be valuable in terms of individual identification of physical capabilities just before the manifestation of arrhythmia. In other words, some tests, including workload treadmill testing (as a provocative tool) might clarify atrial behavior in appreciable fashion.

Retrospectively, an investigation of a large cohort of people divided into age groups with the same or different physical activity levels sometimes appears to be misleading. To a certain extent the conclusions and recommendations even of large scale trials may also be invalid. The prescription of proper physical activity or its limitation for a specific group of people (be they patients, athletes, non-athletes, students, teenagers or octogenarians) actually has some equivocal scientific or practical value. Only individual ("in person") examination, primarily of the cardiovascular system

(electrocardiography, Holter monitoring, treadmill testing, even coronarography - if indicated, etc.) might provide the real answer in respect to profound motivation and subsequent prescription of a specific lifestyle for the specific individual.

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