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Narrative Review

Physical activity and cardiovascular prevention: Is healthy urban living a possible reality or utopia?

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ABSTRACT

Favoring correct lifestyles is the most important measure to contrast cardiovascular diseases and the epidemic of high cardiovascular risk conditions, such as obesity, diabetes, and hypertension. Lifestyle is a broad expression that includes diet, physical exercise, and psychological and socio-economic factors, each of which must be taken into due consideration because of their intertwining influences, which may be a barrier to healthy changes at both the individual and population levels. While physical activity has probably received less attention in the last decades, it is likely the most important among the modifiable risk factors for cardiovascular diseases. Improving the habitual physical activity level is an achievable goal, and even small improvements may have important favorable effects on health. Strategies at the population level have to be urgently taken, and involve not only public health, but also administrators and politicians, starting from a rethinking of our cities.

1. Introduction

Preventing cardiovascular disease (CVD) is an important challenge, given that it is responsible for about 32% and 47% of all deaths in the United States [1] and in Europe [2], respectively. Changing lifestyle is the primary strategy indicated by the WHO and all health authorities for preventing CVD at both the individual and general population levels [3–5]. Physical inactivity, like smoking and unhealthy dietary habits [6], is one of the main targets for effective population-based primary prevention strategies to decrease the high prevalence of CVD [7]. However, only in recent years have global data on physical activity levels and trends become available [8]. Likely underestimated data indicate that the prevalence of physical inactivity is 31% in the world, about 35% in Europe, increasing with age and in high-income countries. Physical inactivity is rapidly increasing in parallel with urbanization and advances in technological innovations. However, our genes were selected when the environment required high levels of physical activity, so that our biological mechanisms probably do not function optimally in our current technological and motorized environment [9]. We need more information on the mechanisms through which physical inactivity favors the spread of non-communicable diseases, but it is also necessary to understand how we can change the current unhealthy way we live, beginning with a rethinking of our cities.

2. Definition of lifestyle

Defining lifestyle is complex, but can be grossly summarized as "*The way in which a person lives*" (Oxford dictionary; www.oxforddictionaries.com accessed on September 10, 2016). Though this is largely a sociological definition, it has potential health implications. In fact, lifestyle includes psychological, historical, cultural, socio-economic, and environmental factors that influence habits, attitudes, tastes, moral standards, and economic levels, which together characterize the mode of living of an individual or a group. The environment is of particular importance in this context: the metropolitan (and, in the same town, the different neighborhoods) [10] or the rural environment [11] have a substantial impact on the lifestyle of the individual and the general population. When the set of all these conditions influences health, meant as psycho-physical well-being, it is referred to as a "healthy lifestyle." Considering the risk factors for coronary heart disease (CHD), in addition to the non-modifiable risk factors (age, gender, race, family history of CHD), the list of modifiable risk factors includes a number of conditions that are strictly connected with lifestyle, such as type 2 diabetes, obesity, hypertension (and also hypercholesterolemia and dyslipidemia, smoking, low level of physical activity, unhealthy diet, alcohol abuse, stress, low socio-economic status, social isolation, anxiety and, depression).

Lifestyle now has a well-recognized role in the pathogenesis of cardiovascular diseases, and looking in-depth at the different components that define lifestyle, some may have an unfavorable cascade effect that impact other risk factors. For instance, social isolation may promote alcohol consumption or eating behavior disorders, which in turn favor the

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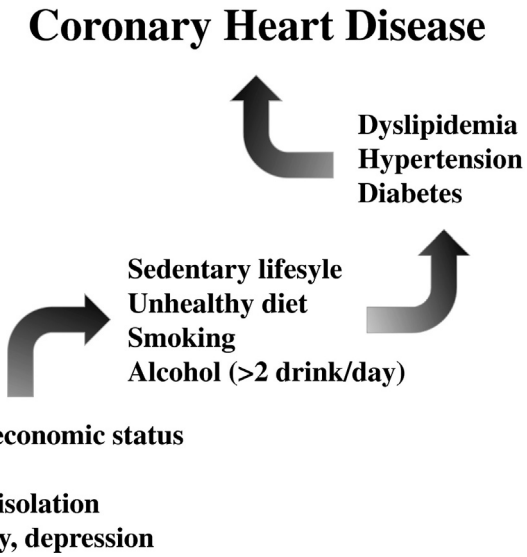

Fig. 1. Interrelationship among cardiovascular risk factors.

appearance of diabetes, dyslipidemia, and hypertension, which can have a significant impact in terms of cardiovascular diseases (Fig. 1). Few studies have demonstrated that interventions at the population level aimed at ameliorating lifestyle are cost-effective [12,13], and recent European guidelines on prevention of cardiovascular disease recommend measures that promote healthy lifestyles at the population level as a class IIa indication, with a level of evidence B [5]. So, it is generally accepted that promotion of a healthy lifestyle at the individual level is mandatory for the prevention of cardiovascular diseases. Diet and physical activity are generally considered the two main components of a healthy lifestyle, and significant results in terms of health are achieved, even in the absence of demanding, structured physical exercise (Tables 1 and 2). However, psycho-social risk factors must be taken into due account since they are a substantial obstacle to lifestyle changes [14–16]. Again, it is of great importance that physicians spend all the necessary time with the patient, listen carefully, and establish a useful dialogue to identify all possible barriers to lifestyle change; the support of questionnaires can be useful to this end. This has been well underscored by current guidelines, which indicate the clinical interviews for identifying psycho-social risk factors and barriers to lifestyle change as a class IIa action, with a level of evidence B [5].

3. The current Western lifestyle

Given the importance of lifestyle, a central question is how far from healthy is lifestyle in Western countries. The ABCD study (Alimentazione Benessere Cardiovascolare e Diabete: a nutritional cardiovascular wellness and diabetes study is a single center cross-sectional and longitudinal observational project [17] that focused on this subject, examining a general population cohort in Palermo, Italy, a city in the Mediterranean Basin http://www.isrctn.com/ISRCTN15840340). This experience was of interest since it gave us a measure of what still remains of the Mediterranean lifestyle, which has long been considered among the healthiest of lifestyles [18]. As reported in Figs. 2 and 3, a very high prevalence of diabetes/pre-diabetes and overweight-obesity were observed [19]. Including people with already known type 2 diabetes, previously unknown type 2 diabetes and pre-diabetes, about one of three adults was affected with these conditions. Similarly, about 70% of the cohort was overweight or obese, a prevalence that is similar to that reported in the U.S. [20]. An analysis of dietary patterns revealed that about 20% of the cohort habitually consumed an unhealthy, fast-food-like diet, and about 60% had a sedentary lifestyle. Only 35% of the cohort consumed a Mediterranean style diet, with a sedentary lifestyle in about 40% of this class of people (the remaining 45% followed an intermediate style diet, and the prevalence of a sedentary lifestyle was 50%) (Fig. 4). Those with an unhealthy lifestyle were roughly 10 years younger than the Mediterranean lifestyle subgroup, and unhealthy lifestyle was associated with insulin resistance [17]. Being less physically active was associated with metabolic syndrome [21], and eating fish at least 2 times a week was protective against carotid atherosclerosis [22]. When compared with the Mediterranean diet subgroup, the unhealthy diet group was also more often composed of single people with no children, and who habitually drank less wine and more hard alcohol. Looking at the teenager cohort ($n = 478$ participants), we collected even less comforting data [19] (Fig. 2). About 16% of the teenagers were overweight, and 5% obese; however, it emerged that 17% were underweight and, interestingly, about 5% refused to be weighed, so these data may hide the presence, to some extent, of no less comforting eating disorders. Among the teenagers, only 20% consumed a Mediterranean style diet, and only 12% played sports with regularity. The prevalence of smokers was 30% (8 cigarettes/day on average), 65% habitually drank alcohol (48% hard alcohol), with no differences in gender. Very alarming data were found in the cohort of children ($n = 245$), aged 9–10 years (Fig. 2). >50% were overweight (20.1%) or obese (33.9%), a result that is not far from that of another survey [23] that indicated a cumulative prevalence of overweight and obesity ≥ 37% in the south of Italy, but once again the data on prevalence that we recorded are very similar to those reported in the U.S. population, even in this class of age [24]. Despite evidence of the favorable effects of physical activity on the physical and mental health of children [25], actual data suggest that the level of habitual physical activity is inadequate even in this age class [26], and that it tends to decline from childhood to adolescence [27]. In our ABCD cohort of children, the prevalence of blood pressure values in the range of hypertension was 29.5% (mild hypertension = 18.5%; moderate = 11.0%) on the basis of systolic values, and 6.4% on the basis of diastolic values, a prevalence that matches that of hypertension in adults [28]. Indeed, both systolic and diastolic blood pressure values ($r = 0.45$; $P < 0.001$) ($r = 0.26$; $P < 0.01$) were significantly correlated with BMI. Interestingly, both systolic blood pressure ($r = -0.22$; $P < 0.01$) and basal heart rate ($r = -0.27$; $P < 0.01$) were inversely correlated with the number of bicycles in

Table 1
Classification of physical activity.

Intensity	Absolute intensity		Relative intensity	
	MET	Examples	%HRmax	Talk test
Light	1.1–2.9	Walking < 4.7 km/h, light household work	50–63	
Moderate	3–5.9	Walking briskly (4.8–6.5 km/h). Slow cycling (15 km/h), painting/decorating, vacuuming, gardening (doubles), ballroom dancing, water aerobics	64–76	Breathing is faster but compatible with speaking full sentences
Vigorous	≥6	Race-walking, jogging or running, bicycling > 15 km/h, heavy gardening (continual digging or hoeing), swimming laps, tennis (singles)	77–93	Breathing is very hard, incompatible with carrying on a conversation comfortably

Adapted from reference [4].
MET: metabolic equivalent (estimated as the energy cost of a given activity divided by resting energy expenditure: 1 MET = 3.5 mL O_2/kg/min).
%HRmax: percentage of measured or estimated maximum heart rate (220-age).

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