122 - THE PRODUCTION OF FREE RADICALS IN PHYSICAL ACTIVITY: A PHYSICAL EDUCATOR'S POINT OF VIEW

MANOEL BENÍCIO TEIXEIRA RIBEIRO;
FRANCILIO DE CARVALHO OLIVEIRA;
JANCINEIDE OLIVEIRA DE CARVALHO;
REGINA MARIA SOUSA DE ARAUJO;
MARIA JOSÉ SOARES MONTE.
Faculdade de Saúde do Piauí- NOVAFAPI, Teresina, Piauí, Brasil
mmonte@novafapi.com.br

INTRODUCTION

Knowledge about free radical production is very important for health professionals, especially for professional advisors of physical activity.

Free radicals are highly reactive and toxic substances produced in our body, which damage cell structures and normal functioning of the metabolism. They are atoms or molecules that contain an odd number of electrons in their last electronic layer (SOARES, 2002; Weineck, 2005). They have been associated with premature aging, immune and inflammatory disorders and other diseases such as cardiovascular diseases, rheumatic diseases, neurological diseases, osteoporosis and diabetes (FERREIRA AND MATSUBARA, 1997; CRUZAT, 2007).

Free radicals can be formed when a covalent bond is broken, so that each portion retains one of the electrons transferred during an oxi-reduction reaction, as occurs in mitochondria during the respiratory chain process (CRUZAT, 2007).

Physical exercise, with due moderation, has organic benefits. However, a large number of studies strongly suggest that the production of free radicals is increased as a result of intense aerobic exercise. The mechanisms responsible for this increase include mainly an increase in oxygen consumption. Free radicals cause damage to lipid membranes, proteins, DNA and other cellular constituents. In contrast, moderate exercise can protect the body from the deleterious effects of free radicals, because it increases the cellular antioxidant capacity, and is therefore beneficial to health. (WEINECK, 2005; CRUZAT, 2007; KLEINER, 2009).

The increase of free radicals during exercise may occur for several reasons: an increase in the level of catecholamines, lactic acid production, an increase in hemoglobin autoxidation, hyperthermia, and especially because of increased oxygen consumption (CRUZAT, 2007; KLEINER, 2009) .

The body has various mechanisms to eliminate free radicals and successfully combat oxidative stress: antioxidants. These agents are responsible for inhibition and

reduction of injuries caused by free radicals. Their origin may be from food, endogenous or protection origin (CRUZAT, 2007). The human antioxidant defense system consists mainly of catalase enzymes, superoxide dismutade (SOD) and glutathione peroxidase (GSH) whose roles are to maintain equilibrium between radical production by inactivating their harmful effects on the organism (COOPER, 2005; FANHANI AND FERREIRA , 2006).

Therefore, this study aimed to discuss the production of free radicals in the body, their side effects for health as well as the importance of antioxidants for health, based on data obtained from questionnaires given to physical activity supervisor teachers in the city of Teresina - Piauí .

METHOD

This is a cross-sectional, quantitative-oriented field research. It was forwarded to and approved by the Ethics and Research of NOVAFAPI University.

The study was carried out in Teresina in the second semester of 2008, in 10 gyms in the eastern section of the city, located on the segment that includes the avenues Raul Lopes and Zequinha Freire, out of a universe of 15 gyms. The subjects were 50 professional physical activity instructors in Teresina, PI, who workat the selected gyms. The selection of gyms and supervisors was conducted randomly. The region was selected because of its vicinity to the universities which the researchers belong.

Both the gyms and the subjects were coded in order to preserve them from any moral damage.

Data collection was conducted through questionnaires, and consent was previously given by research subjects. The data were organized into charts and tables and treated statistically.

The parameters to be evaluated covered the levels of knowledge about the production of free radicals, related diseases and the importance of antioxidants for health.

RESULTS

From the data collected, it was observed that the majority (64%) of physical activity supervisors surveyed were aged between 18 to 30 years and of these, the prevalence was for males (Table 1).

As for level of education, 38% of respondents had completed higher education in their field.

Table 01. Personal Characteristics

Personal Characteristics						
Gender	Frequency					
	Total		Male		Female	
Age range	f	%	f	%	f	%
18 a 30	32	64	22	69	12	67
31 a 65	18	36	10	31	6	33
= 66	0	0	0	0	0	0
Total	50	100	32	100	18	100

When questioned about their level of knowledge of the production of free radicals in the body, it was observed that most had knowledge from average to not enough (Table 2).

Table 2. Level of knowledge versus production of free radicals by the body

Level of knowledge versus productino of free radicals by the						
	Frequency					
	Total		Male		Female	
	f	%	f	%	f	%
Insufficient	0	0	0	0	0	0
Barely Sufficient	14	28	7	22	7	39
Avarege Sufficient	16	32	12	38	4	22
Suffcient	18	36	11	34	7	39
Highly Sufficient	2	4	2	6	0	0
Total	50	100	32	100	18	100

It was observed that the knowledge of the majority of the sample ranged average to insufficient (Table 3) regarding the action of free radicals on aging.

Table 3. Action of radicals and premature aging

Action of radicals and premature aging						
	Frequency					
	Total		Male		Female	
	f	%	f	%	f	%
Insufficient	3	6	1	3	2	11
Barely Sufficient	14	28	10	31	4	22
Avarege Sufficient	17	34	11	34	6	33
Suffcient	14	28	8	25	6	33
Highly Sufficient	2	4	2	6	0	0
Total	50	100	32	100	18	100

When requested to select, from a list of five diseases, those related to the action of free radicals, the majority of supervisors selected premature aging (Figure 1).

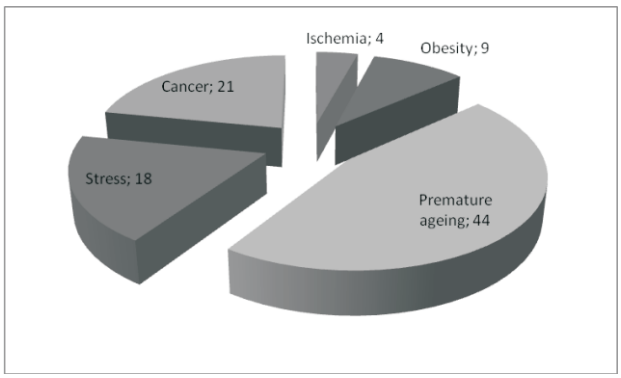

Figure 1. Diseases related to production of free radicals

The inclusion of antioxidant foods in the diet can improve quality of life, preventing, in this way, chronic diseases and premature aging. When shown that statement, the vast majority of the supervisors said they had sufficient knowledge (Figure 2).

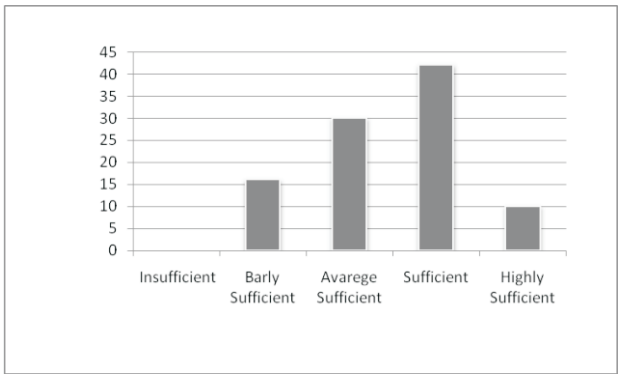

Figure 2. Healthy eating versus quality of life (total %)

DISCUSSION

It was observed that the target population studied is composed mostly of young people and of these, 69% are male; this shows that there is still a higher prevalence of men in the labor market. The fact that 60% of advisors do not possess a sufficient level of knowledge can be justified by the fact that 62% of them do not have a university degree.

Physical exercise, with due moderation, has organic benefits. However, a large number of studies strongly suggest

that the production of free radicals is increased as a result of intense aerobic exercise. The mechanisms responsible for this increase include mainly an increase in oxygen consumption. Free radicals cause damage to lipid membranes, proteins, DNA and other cellular constituents. In contrast, moderate exercise can protect the body from the deleterious effects of free radicals, because it increases cellular antioxidant capacity, and is, therefore, beneficial to health. (WEINECK, 2005; KLEINER, 2009).

Physical educators showed little knowledge about the action of free radicals in the body and, consequently, the mechanism of action of antioxidants to neutralize them. Physical activity increases respiration, producing more free radicals. Scientists are still studying this phenomenon and a way of defending against them; however, exercise also induces the synthesis of enzymes that fight free radicals (KLEINER, 2009).

There is experimental evidence proving the involvement of free radicals in the

development of various pathophysiological processes such as aging, cancer, inflammatory diseases and atherosclerosis. The imbalance of free radicals in the body can occur due to factors that lead to the overproduction or deficiency of antioxidant mechanisms (CRUZAT, 2007; KLEINER, 2009).

Under normal conditions, free radicals are produced in a low concentration, and are neutralized by antioxidants and protective systems of the body. If, however, a much increased proportion of free radicals produced is triggered by overtraining, the number of radicals may overwhelm the capacity of cellular defense systems. This will trigger free radical attack against the cell membranes with a resulting loss of cell viability and an increase in skeletal and muscle damage (COOPER, 2005).

Educators gave little attention to ischemia (Figure 1), even though this disorder is related to exhaustive exercise (NETO, 2005; SANTOS, 2006). Ischemia occurs in intense exercise where blood flow is diverted from organs that are not actively involved in exercises such as the liver, kidneys, stomach and intestines, to working muscles, including the heart and legs. Thus, at the end of exercise blood perfuses, which is associated with the release of an excessive number of free radicals (COOPER, 2005).

In the case of cancer, free radicals act in a different way. They also are triggered by environmental factors, such as cigarette smoke, pollution, ultraviolet radiation and, possibly, in response to stress and excessive physical exercise. In cancer, however, the radicals reach the interior of cells and damage the nucleus, which contains DNA, and as a result growth becomes uncontrolled (COOPER, 2005).

A diet rich in antioxidant should be the mainstay of nutrients eaten (COOPER, 2005). Antioxidants act at different levels in the protection of organisms such as:

a. preventing the formation of free radicals, mainly by inhibition of chain reactions with iron and copper;

b. intercepting free radicals generated by cellular metabolism or exogenous sources, which prevents the attack on lipids, aminoacids proteins, the double bond of polyunsaturated fatty acids and DNA bases, preventing the formation of injuries and loss of cellular integrity;

c. promoting the repair of damage caused by these radicals, a process related to the removal of damage of the DNA molecule and restoration of the damaged cell membranes (BIANCHI, 2008).

The fact that physical educators have demonstrated sufficient knowledge about the importance of antioxidants to improve quality of life, leads us to suppose that they require a greater improvement in their studies in order to apply the knowledge to their daily work routine.

CONCLUSION

It can be concluded that the supervisors surveyed had a moderately sufficient knowledge about free radicals and did not have enough information about their mechanisms of action in the body. They also had little knowledge about the oxidative stress-related diseases questioned about in research.

However, the supervisors recognize the importance of healthy eating combined with physical activity in health promotion.

It is therefore evident that there is the need for multidisciplinary training in order to improve the efficiency of training to promote health and quality of life.

ACKNOWLEDGEMENTS
NOVAFAPI

REFERENCES

1.BIANCHI, M. L. P.; ANTUNES, L. M. G. Radicais livres e os principais antioxidantes da dieta. Rev. Nutr. Campinas, 1999; 12 (2): 123-130.

2.COOPER, K. H. Revolução Antioxidante. 3 ed., Rio de Janeiro: Record, 2005.

3.CRUZAT, V. F. Aspectos atuais sobre estresse oxidativo, exercícios físicos e suplementação. Rev. Bras. Med. Esporte, 2007; 13 (5): 336 -339.

4.FANHANI, A.M.G.; FERREIRA, M.P. Agentes antioxidantes: seu papel na nutrição e saúde dos atletas. Sábios Ver. Saúde e Biol., 2006; 1(2).

5.FERREIRA, A.L.A.; MATSUBARA L.S. Radicais livres: conceitos, doenças relacionadas, sistema de defesa e estresse oxidativo. Rev. Assoc. Med. Bras., 1997; 43-46.

6.KLEINER, S. M. Nutrição para o treinamento de força. 3 ed., Barueri: Manole, 2009.

7.NETO, A. F.; SILVA, J. C. C. B.; FAGUNDES, D. J.; PERCÁRIO, S.; NOVO, N. F.; JULIANA, Y.; NETO, A. A. M. estudo das alterações oxidativas, da capacidade antioxidante total e do óxido nítrico em ratos submetidos à isquemia e reperfusão de membros posteriores. Acta Cirúrgica Brasileira, 2005; 2 ed, 20: 134-138.

8.PASCHOAL, V. C. P. Radicais livres e exercícios físicos. J. Biomolec. Med. Free Rad., 1998; 4 (1): 20-26.

9.SANTOS, C. H. M.; PONTES, J. C. D.V.; GOMES, O. M. Terapêutica medicamentosa na isquemia e reperfusão mesentérica: revisão da literatura. Rev. Brasileira de Coloproct., 2006; 26 (1): 28-33.

10.SOARES, S. E. Ácidos fenólicos como antioxidante. Rev. Nutr. Campinas, 2002; 15 (1): 71-81.

11.WEINECK, J. Biologia do Esporte, 7 ed. Barueri: Manole, 2005.

THE PRODUCTION OF FREE RADICALS IN PHYSICAL ACTIVITY: A PHYSICAL EDUCATOR'S POINT OF VIEW

ABSTRACT

The study aimed to discuss the production of free radicals in the body, the problems it can cause and the importance of antioxidants for health, based on data obtained from questionnaires given to physical activity supervisor teachers in the city of Teresina - Piauí. To support the study, a survey was carried out with 50 supervisors at 10 gyms in the city of Teresina-Piauí, to

assess the level of knowledge about the formation and activity of free-radicals in the body and the action of antioxidants in the customary diet of people who exercise. The results showed that the supervisors generally have a moderately sufficient knowledge about free radicals. They do not have enough information about their action mechanisms in the body. Therefore it is evident that multidisciplinary training is needed with the aim of improving the efficiency of training to promote health and quality of life.

KEY WORDS: free radicals, antioxidants, knowledge, health, quality of life.

LA PRODUCTION DE RADICAUX LIBRES DANS L'ACTIVITÉ PHYSIQUE: LA VISION DE L'ÉDUCATEUR PHYSIQUE

RÉSUMÉ

L'étude a visé à discuter la production de radicaux libres dans l'organisme, ses dommages et l'importance des antioxydants pour la santé, basée sur les données obtenues à partir des questionnaires distribués aux entraîneurs d'activité physique dans la ville de Teresina - Piauí. Pour baser l'étude, une enquête a été menée auprès de 50 entraîneurs. dans 10 gymnases de la ville de Teresina-PI, afin d'évaluer leur niveau de connaissances sur la formation et l'exécution des radicaux dans l'organisme et aussi l'action des antioxydants dans la diète habituelle des pratiquants d'activités physiques. Les résultats obtenus ont montré que les entraîneurs ont d'une manière générale une connaissance moyenne suffisante sur les radicaux libres, mais ils n'ont pas assez d'informations sur leurs mécanismes d'action dans le corps. Donc, il est évident le besoin d'une formation pluridisciplinaire visant à améliorer l'efficacité de la formation pour promouvoir la santé et la qualité de vie.

MOTS-CLÉS: radicaux libres, antioxydants, connaissance, santé, qualité de vie

LA PRODUCCIÓN DE LOS RADICALES LIBRES EN LA ACTIVIDAD FÍSICA: LA VISIÓN DEL EDUCADOR FÍSICO

RESUMEN

El estudio quiso discutir la producción de radicales libres por el organismo, sus malefícios y la importancia de los antioxidantes para la salud, basado en datos obtenidos a través de cuestionários aplicados a profesores orientadores de actividade física de la ciudad de Teresina - Piauí. Para fundamentar el estudio, fue realizado una investigación con 50 orientadores, en 10 gimnasias de la ciudad de Teresina-PI, a fin de evaluar el nivel de conocimiento de ellos sobre la formacción y actuacción de los radicales en el organismo, así como la acción de los antioxidantes en la dieta habitual de los practicantes de actividades físicas. Los resultados obtenidos demonstraron que los orientadores de un modo general poseen un conocimiento medianamente suficiente a cerca de los radicales libres. Y no poseen informaciones suficientes sobre los mecanismos de la acción de ellos en el organismo. Por lo tanto queda evidenciada la necesidad de una formacción multidisciplinar visando a la mejoria de la eficiencia del entrenamiento para la promocción de la salud y de una cualidade de vida.

PALABRAS-CLAVE: radicales libres, antioxidantes, conocimiento, salud, cualidade de vida

A PRODUÇÃO DOS RADICAIS LIVRES NA ATIVIDADE FÍSICA: A VISÃO DO EDUCADOR FÍSICO

RESUMO

O estudo visou discutir a produção de radicais livres pelo organismo, seus malefícios e a importância dos antioxidantes para a saúde, baseado em dados obtidos através de questionários aplicados a professores orientadores de atividade física da cidade de Teresina - Piauí. Para fundamentar o estudo, foi realizado uma pesquisa com 50 orientadores, em 10 academias da cidade de Teresina-PI, a fim de avaliar o nível de conhecimento destes sobre a formação e atuação dos radicais no organismo, assim como a ação dos antioxidantes na dieta habitual dos praticantes de atividades físicas. Os resultados obtidos demonstraram que os orientadores de um modo geral possuem um conhecimento medianamente suficiente a cerca dos radicais livres. E não possuem informações suficientes sobre os mecanismos da ação destes no organismo. Portanto fica evidenciada a necessidade de uma formação multidisciplinar visando à melhoria da eficiência do treinamento para a promoção da saúde e de uma qualidade de vida.

PALAVRAS-CHAVE: radicais livres, antioxidantes, conhecimento, saúde e qualidade de vida

PUBLICAÇÃO NO FIEP BULLETIN ON-LINE: http://www.fiepbulletin.net/80/a2/122