61 - POSSIBLE CONTRIBUTION OF DIET AND PHYSICAL INACTIVITY FOR THE PATTERNS OF MORBIDITY AND MORTALITY DYNAMICS, AS REFERRED TO METABOLIC SYNDROME AND CANCER IN AGING

VIKTOR IVANOVITCH GOUDOCHNIKOV
Santa Maria - RS, Brazil
vitorig@yahoo.com.br

INTRODUCTION

Previously we have suggested the important role of physical inactivity and diet in the dynamics of morbidity and mortality due to metabolic syndrome in aging (Goudochnikov, 2005). Besides, our recent study compared the dynamics of relative mortality due to the components of metabolic syndrome and various cancer types in the state of Rio Grande do Sul (RS) during the period 2001-2004 (Goudochnikov, 2007). In the present work this study was amplified, including the data of morbidity in RS, as well the data of morbidity and mortality for another two states, Santa Catarina and Paraná that belong also to Southern region of Brazil.

METHODOLOGY

The data for every state were obtained from the database DataSus. The data for each age group and for both sexes were calculated in the form of the percentage of total annual morbidity or mortality in all age groups for each disease, with posterior calculation of the values of arithmetic mean and standard error in the period of 2001-2004. Besides, the fraction of feminine sex was calculated for each age group and each disease, with posterior calculation of the values of arithmetic mean and standard error in the same period of 2001-2004. As for bibliographic analysis, we have evaluated, in amplified mode, Latin-American and world literature, at least in 3 languages and 4 databases, stressing the importance of diet and physical inactivity for the predisposition to various cancer types.

RESULTS AND DISCUSSION

In accord to the tables 1-4 demonstrating important examples for the state of RS (but not all the data available), only some cancer types presented the patterns of age-dependent dynamics of morbidity and mortality, similar to patterns of dynamics of the components of metabolic syndrome. Besides, essential age-related sex differences were observed for some cancer types. The study has not revealed notable differences between the data of the states evaluated (data not shown).

The amplified bibliographic analysis confirmed that, in general, the predisposition to metabolic syndrome and cancer can have the contribution of diet and physical inactivity. In fact, according to Macieira-Coelho (2001), the morbidity rate for all cancer types attains the maximum level at the age of 75 years, however each cancer type has its own pattern of distribution of morbidity along the age scale. In accord to Pompei et al. (2001), cancer incidence in human population augments till the age of 70 years and diminishes after that. The same dynamics was registered in mice, with maximal level at the age of approximately 1.5-2 years. Caloric restriction caused the translocation of pattern to more advanced age groups (2.5-3 years).

According to Bianchini et al. (2002), obesity and overweight, as well as physical inactivity (sedentarism) can augment the risk of cancer in general, particularly the cancer of colon, kidney, esophagus, breast and endometrium. This influence is probably mediated by insulin, insulin-like growth factor type I (IGF-I) and IGF-binding proteins (IGF-BPs). On the other hand, physical activity has protective action against these cancer types. Caloric restriction inhibits the cancer of breast, colon, skin, liver, hypophysis and limphomas in laboratory animals; physical activity has preventive action also. Obesity and physical inactivity cause chronic insulin resistance and hyperinsulinemia which in turn result in diminution of the concentrations of IGF-BPs (types 1 and 2) and sex hormone-binding globulin (SHBG) and in augment of free levels of IGF-I and sex steroid hormones in blood. In accord to Barnard et al. (2002), hyperinsulinemia appears to augment the production of IGF-I and to decrease the production of IGF-BPs (types 1 and 2) and SHBG by the liver. Hypocaloric diet and regular exercise have opposite effects; this is especially important for prostate cancer. According to Hursting et al. (2003), caloric restriction augments apoptosis rate and diminishes DNA synthesis rate, resulting in much lower number and volume of preneoplastic lesions.

In accord to Erikssen (2001), mortality rate from cardiovascular diseases, diabetes mellitus and cancer is inversely proportionate to the grade of physical adaptation (fitness) of men in the age group of 40-60 years. According to Giovannucci (2005), from all cancer types, cancer of colon has the highest association with metabolic syndrome, particularly with diabetes mellitus of type 2. Exactly for this cancer type there exist more convincing data about protective action of physical activity. On the other hand, central obesity appears to augment the risk of breast cancer. In accord to Shepard & Shek (1998), physical activity is associated with lower risk of cancer of colon, breast, lung and of reproductive system, whereas overweight augments the risk of cancer of colon and endometrium. It is important also that caloric restriction helps to “preserve” immune system, whereas physical exercise stimulates it.

CONCLUSION

The results obtained suggest that patterns of the dynamics of morbidity and mortality due to cancer cannot be explained by the unique scheme of aging. On the other hand, it seems that hypocaloric diet and moderate physical activity are able to partially modify the patterns of augmenting morbidity and mortality in aging, causing their translocation to more advanced age groups.

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Table 1

Patterns of the dynamics of relative morbidity (in % of total annual morbidity) from diseases associated with metabolic syndrome and some cancer types for both sexes in the state of RS during the period of 2001-2004.

Disease	Age group, years								
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80 and more
Hypertensive disease	0.23 ÿ 0.03	1.05 ÿ 0.05	3.48 ÿ 0.26	8.28 ÿ 0.25	17.5 ÿ 0.2	22.1 ÿ 0.14	21.8 ÿ 0.22	18.0 ÿ 0.16	7.5 ÿ 0.13
Diabetes mellitus	1.55 ÿ 0.03	3.8 ÿ 0.07	3.95 ÿ 0.33	6.23 ÿ 0.22	12.7 ÿ 0.32	21.2 ÿ 0.23	24.4 ÿ 0.34	19.0 ÿ 0.42	7.23 ÿ 0.29
Myocardium infarction	-	0.13 ÿ 0.03	0.5 ÿ 0	3.43 ÿ 0.26	14.9 ÿ 0.38	24.7 ÿ 0.45	26.4 ÿ 0.23	20.4 ÿ 0.77	9.03 0.3
Cancer of larynx	1.43 ÿ 0.48	0.77 ÿ 0.32	1.03 ÿ 0.22	3.58 ÿ 0.59	17.7 ÿ 0.36	33.4 ÿ 2.75	28.0 ÿ 1.75	12.5 ÿ 0.16	2.13 ÿ 0.28
Cancer of pancreas	-	0.87 ÿ 0.2	3.18 ÿ 0.15	6.25 ÿ 1.31	11.9 ÿ 1.82	20.7 ÿ 1.74	27.2 ÿ 0.96	21.9 ÿ 0.85	8.0 ÿ 1.49
Cancer of the skin	6.6 ÿ 0.84	5.3 ÿ 1.42	11.0 ÿ 0.39	11.3 ÿ 0.29	15.2 ÿ 1.03	19.8 ÿ 4.08	14.3 ÿ 0.79	11.6 ÿ 0.37	5.08 ÿ 0.37

Table 2

Patterns of the dynamics of relative mortality (in % of total annual mortality) from diseases associated with metabolic syndrome and some cancer types for both sexes in the state of RS during the period of 2001-2004.

Disease	Age group, years						
	20-29	30-39	40-49	50-59	60-69	70-79	80 and more
Hypertensive disease	0.3 ÿ 0.04	1.28 ÿ 0.08	5.75 ÿ 0.36	11.9 ÿ 0.25	18.8 ÿ 0.7	27.9 ÿ 0.85	34.1 0.62
Diabetes mellitus	0.55 ÿ 0.03	1.35 ÿ 0.17	4.65 ÿ 0.24	13.0 ÿ 0.26	25.2 ÿ 0.66	32.1 ÿ 0.27	23.0 ÿ 0.77
Myocardium infarction	0.25 ÿ 0.06	1.88 ÿ 0.11	7.5 ÿ 0.29	15.4 ÿ 0.15	24.2 ÿ 0.37	28.7 ÿ 0.28	22.1 ÿ 0.77
Cancer of larynx	-	1.28 ÿ 0.33	13.9 ÿ 1.0	28.0 ÿ 1.2	29.5 ÿ 1.2	20.2 ÿ 0.4	6.6 ÿ 0.8
Cancer of pancreas	-	1.65 ÿ 0.3	5.3 ÿ 1.0	14.5 ÿ 0.8	27.0 ÿ 0.8	31.6 ÿ 1.1	19.8 ÿ 0.8
Cancer of the skin	4.15 ÿ 0.8	10.5 ÿ 1.8	15.2 ÿ 1.15	20.9 ÿ 1.05	19.4 ÿ 1.6	18.4 ÿ 1.3	11.1 ÿ 1.45

Table 3

Fraction of feminine sex (in %) for morbidity from diseases associated with metabolic syndrome and some cancer types in the state of RS during the period of 2001-2004.

Disease	Age group, years								
	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80 and more
Hypertensive disease	45.3 ÿ 2.99	73.3 ÿ 1.32	79.2 ÿ 1.57	74.0 ÿ 0.55	67.4 ÿ 0.86	62.0 ÿ 0.28	61.6 ÿ 0.69	67.3 ÿ 0.3	73.0 ÿ 1.1
Diabetes mellitus	47.6 ÿ 1.3	58.0 ÿ 1.6	64.3 ÿ 0.48	61.0 ÿ 1.35	58.2 ÿ 0.67	59.6 ÿ 1.13	63.3 ÿ 1.6	70.2 ÿ 1.22	75.0 ÿ 0.76
Myocardium infarction	-	27.9 ÿ 9.79	30.1 ÿ 3.71	31.0 ÿ 0.79	31.8 ÿ 0.62	31.1 ÿ 1.11	38.1 ÿ 1.18	48.9 ÿ 0.69	59.8 ÿ 0.74
Cancer of larynx	51.1 ÿ 8.91	42.1 ÿ 4.84	65.6 ÿ 13.9	47.7 ÿ 7.8	20.8 ÿ 4.6	18.2 ÿ 3.13	11.1 ÿ 2.05	14.3 ÿ 3.14	19.1 ÿ 9.5
Cancer of pancreas	-	16.7 ÿ 16.7	46.2 ÿ 9.19	34.3 ÿ 4.11	33.3 ÿ 2.96	47.3 ÿ 3.14	56.0 ÿ 2.17	51.9 ÿ 1.53	65.2 ÿ 4.63
Cancer of the skin	44.6 ÿ 5.78	23.1 ÿ 7.8	31.9 ÿ 1.45	45.0 ÿ 5.46	45.8 ÿ 4.41	39.8 ÿ 4.57	48.8 ÿ 9.69	51.5 ÿ 3.01	50.6 ÿ 6.11

Table 4

Fraction of feminine sex (in %) for mortality from diseases associated with metabolic syndrome and some cancer types in the state of RS during the period of 2001-2004.

Disease	Age group, years						
	20-29	30-39	40-49	50-59	60-69	70-79	80 and more
Hypertensive disease	42.1 ÿ 7.9	47.4 ÿ 5.8	49.6 ÿ 1.2	45.4 ÿ 2.1	47.3 ÿ 0.94	58.1 ÿ 2.6	70.9 ÿ 0.29
Diabetes mellitus	56.7 ÿ 4.7	49.4 ÿ 3.9	50.1 ÿ 2.2	46.0 ÿ 1.2	51.8 ÿ 0.9	60.3 ÿ 0.8	71.6 ÿ 0.7
Myocardium infarction	33.5 ÿ 4.3	32.0 ÿ 1.8	28.6 ÿ 1.1	30.7 ÿ 0.3	36.2 ÿ 0.6	46.6 ÿ 0.4	61.8 ÿ 0.6
Cancer of larynx	-	6.3 ÿ 6.3	10.1 ÿ 2.9	8.1 ÿ 1.9	11.4 ÿ 0.6	12.9 ÿ 1.4	26.9 ÿ 7.6
Cancer of pancreas	-	35.5 ÿ 5.7	35.3 ÿ 2.7	41.8 ÿ 0.8	46.4 ÿ 3.4	54.3 ÿ 1.3	68.8 ÿ 2.6
Cancer of the skin	57.4 ÿ 8.3	48.9 ÿ 6.8	45.2 ÿ 7.2	35.2 ÿ 3.0	37.8 ÿ 6.9	46.3 ÿ 6.0	48.7 ÿ 8.1

Rua Matoso Camara, 73, Bairro Dores, Santa Maria RS, CEP 97050-500, Brazil
Telephone: (55) (55) 3223-0180

POSSIBLE CONTRIBUTION OF DIET AND PHYSICAL INACTIVITY FOR THE PATTERNS OF MORBIDITY AND MORTALITY DYNAMICS, AS REFERRED TO METABOLIC SYNDROME AND CANCER IN AGING

ABSTRACT

(Introduction) Previously we have suggested the important role of physical inactivity and diet in the dynamics of morbidity and mortality due to metabolic syndrome in aging (Goudochnikov, 2005). Besides, our recent study compared the dynamics of relative mortality due to the components of metabolic syndrome and various cancer types in the state of Rio Grande do Sul (RS) during the period 2001-2004 (Goudochnikov, 2007). In the present work this study was amplified, including the data of morbidity of RS, as well the data of morbidity and mortality for another two states, Santa Catarina and Paraná that belong also to Southern region of Brazil. (Methodology) The data for every state were obtained from the database DataSus. The data for each age group and for both sexes were calculated in the form of the percentage of total annual morbidity or mortality in all age groups for each disease, with posterior calculation of the values of arithmetic mean and standard error in the period of 2001-2004. Besides, the fraction of feminine sex was calculated for each age group and each disease, with posterior calculation of the values of arithmetic mean and standard error in the same period of 2001-2004. As for bibliographic analysis, we have evaluated, in amplified mode, Latin-American and world literature, at least in 3 languages and 4 databases, stressing the importance of diet and physical inactivity for the predisposition to various cancer types. (Results) Only some cancer types presented the patterns of age-dependent dynamics of morbidity and mortality, similar to patterns of dynamics of the components of metabolic syndrome. Besides, essential age-related sex differences were observed for some cancer types. The study has not revealed notable differences between the data of the states evaluated. The amplified bibliographic analysis confirmed that, in general, the predisposition to metabolic syndrome amd cancer can have the contribution of diet and physical inactivity. (Conclusion) The results obtained suggest that patterns of the dynamics of morbidity and mortality due to cancer cannot be explained by the unique scheme of aging. On the other hand, it seems that hypocaloric diet and moderate physical activity are able to partially modify the patterns of augmenting morbidity and mortality in aging, causing their translocation to more advanced age groups.

Key words: cancer; diet; physical inactivity.

CONTRIBUITION POSSIBLE DE RÉGIME ALIMENTAIRE ET D'INACTIVITÉ PHYSIQUE POUR LES PROFILS DE LA DYNAMIQUE DE MORBIDITÉ ET MORTALITÉ, REFERÉS AU SYNDROME MÉTABOLIQUE ET AU CANCER DANS LE VIEILLISSEMENT.

RESUMÉ

(Introduction) Il a été suggéré précédemment le rôle de l'inactivité physique et le régime alimentaire dans la dynamique de la morbidité et mortalité dans le syndrome métabolique avec le vieillissiment (Goudochnikov, 2005). En plus, dans notre récente étude, on a comparé la dynamique de la mortalité relative des éléments de le syndrome métabolique et de divers types de cancer dans l'etat de Rio Grande do Sul (RS) dans lês années 2001 à 2004 (Goudochnikov, 2007). Dans ce travail en cours, l'étude a été étendu, y compris les données de morbidité du RS, ainsi que des données de la morbidité et mortalité de deux autres états: Santa Catarina et Paraná qui appartiennent aussi au sud du Brésil. (Méthodologie) les données de chaque état ont été obtenus à partir de la base de données DataSus. Les données pour chaque groupe d'âge et pour les deux sexes ont été calculés en pourcentage de la morbidité ou mortalité total annuel en chaque groupe d'âge pour chaque trouble, et puis à calculer les valeurs de la moyenne arithmétique et erreur-type au cours des années 2001 à 2004. En plus, Il a été calculé la fraction du sexe féminin pour chaque groupe d'âge et chaque trouble, et puis à calculer les valeurs de la moyenne arithmétique et erreur standard de la même période. En ce qui concerne la revue de la littérature, Il a été évaluée de la littérature latino-américaine et mondiale, dans trois langues au moins, et quatre bases de données, soulignant l'importance du régime alimentaire et d'inactivité physique pour la prédisposition des plusiers types de cancer. (Résultats) Seulement certains types de cancer ont montré les profils de la dynamique de la morbidité et mortalité, en fonction d'âge, similaires aux profils de la dynamique des éléments de syndrome métabolique. En plus, on a observé des différences sexuelles claires, en fonction de l'âge, pour certains types de cancer. On n'a pas enregistré des differences notables entre les données de les trois états évalués. La revue de la litterature a confirmé que, en general, la prédisposition au syndrome métabolique et au cancer, peut avoir une contribution de régime alimentaire et l'inatctivité physique. (Conclusion) Les résultats suggèrent que les profils de la dynamique de la morbilité et de la mortalité du cancer ne peut pas être explique uniquement par le vieillissement. En outre, Il semble en fait qu'une régime alimentaire hypocalorique et l'activité physique modérée sont en mesure de modifier partiellement les profils de l'augmentation de la morbidité et de la mortalité avec l'âge, entraînant son passage à un âge plus avancé.

Paroles clé: cancer; diéte; inactivité physique.

CONTRIBUCIÓN POSIBLE DE LA DIETA Y INACTIVIDAD FÍSICA PARA LOS PERFILES DE LA DINAMICA DE MORBILIDAD Y MORTALIDAD REFERENTES AL SINDROME METABOLICO Y CANCER EN ENVEJECIMIENTO

RESUMEN

(Introducción) Anteriormente fue sugerido el rol de inactividad física y dieta en dinamica de morbilidad y mortalidad del síndrome metabólico con envejecimiento (Goudochnikov, 2005). En nuestro estudio reciente fue comparada la dinamica de mortalidad relativa de componentes del síndrome metabólico y diferentes tipos de cancer en el estado de Rio Grande del Sur (RS) en el período de años 2001-2004 (Goudochnikov, 2007). En trabajo actual este estudio fue ampliado, incluindo los datos de morbilidad de RS y los datos de morbilidad y mortalidad para los dos otros estados, Santa Catarina y Paraná que también hacen la parte de la región Sur del Brasil. (Metodologia) Los datos para cada estado fueron obtenidos de basis de datos DataSus. Los datos para cada grupo de edad y para ambos los sexos fueron recalculados en la forma de porcentaje de morbilidad o mortalidad total anual en todos los grupos de edad para cada enfermedad, con posterior calculo de los valores de media aritmética y erro estandard en el período de 2001-2004. Fue calculada también la fracción del sexo femenino para cada grupo de edad y cada enfermedad, con posterior calculo de los valores de media aritmética y erro estandard en lo mismo período de 2001-2004. Para la analisis bibliográfica fue valuada, de modo ampliado, la literatura latino-americana y mundial em 3 idiomas y 4 basis de datos, destacando la importancia de dieta y inactividad física para la predisposición a los diferentes tipos de cancer. (Resultados) Solamente algunos tipos de cancer presentaron los perfiles de la dinamica de morbilidad y mortalidad dependentes de la edad, semejantes a los perfiles de dinamica de componentes del síndrome metabólico. Fueron observadas también las diferencias sexuales nítidas, dependentes de la edad, para algunos tipos de cancer. No fueron registadas las diferencias notables entre los datos de 3 estados valuados. La analisis bibliográfica ampliada confirmó que, de modo general, la predisposición al síndrome metabólico y câncer puede tener la contribución de dieta y inactividad física. (Conclusión) Los resultados obtenidos sugeren que los perfiles de la dinamica de morbilidad y mortalidad de cancer no pueden ser explicados por unico esquema de envejecimiento.

Sin embargo, la dieta hipocalórica y actividad física son capaces de modificar parcialmente los perfiles de aumento de morbilidad y mortalidad con envejecimiento, causando la deslocación para los grupos de edad mas avanzados.

Palabras clave: cancer; dieta; inactividad física.

POSSÍVEL CONTRIBUIÇÃO DE DIETA E INATIVIDADE FÍSICA PARA OS PERFIS DA DINÂMICA DE MORBIDADE E MORTALIDADE, REFERENTES A SÍNDROME METABÓLICA E CÂNCER NO ENVELHECIMENTO

RESUMO

(Introdução) Anteriormente sugeriu-se o papel de inatividade física e dieta na dinâmica de morbidade e mortalidade na síndrome metabólica com o envelhecimento (Goudochnikov, 2005). Além disso, em nosso estudo recente comparou-se a dinâmica da mortalidade relativa de componentes da síndrome metabólica e de vários tipos de câncer no estado do Rio Grande do Sul (RS) nos anos 2001 a 2004 (Goudochnikov, 2007). No trabalho atual este estudo foi ampliado, incluindo os dados de morbidade do RS, bem como os dados de morbidade e mortalidade para os dois estados a mais, Santa Catarina e Paraná que pertencem também a região Sul do Brasil. (Metodologia) Os dados para cada estado foram obtidos do banco de dados DataSus. Os dados para cada faixa etária e para ambos os sexos foram recalculados na forma de porcentagem de morbidade ou mortalidade total anual em todas as faixas etárias para cada distúrbio, com posterior cálculo dos valores de média aritmética e erro-padrão no período de anos 2001 a 2004. Além disso, foi calculada a fração do sexo feminino para cada faixa etária e cada distúrbio, com posterior cálculo dos valores de média aritmética e erro-padrão no mesmo período de anos 2001 a 2004. No que se refere a análise bibliográfica, avaliou-se, de modo ampliado, a literatura latino-americana e mundial, pelo menos em três idiomas e quatro bancos de dados, destacando a importância da dieta e inatividade física para a predisposição a vários tipos de câncer. (Resultados) Somente alguns tipos de câncer apresentaram os perfis da dinâmica de morbidade e mortalidade, dependentes de idade, semelhantes a perfis da dinâmica de componentes da síndrome metabólica. Além disso, foram observadas nítidas diferenças sexuais, dependentes de idade, para alguns tipos de câncer. Não registrou-se as diferenças notáveis entre os dados de três estados avaliados. A análise bibliográfica ampliada confirmou que, de modo geral, a predisposição a síndrome metabólica e câncer pode ter a contribuição de dieta e inatividade física. (Conclusão) Os resultados obtidos sugerem que os perfis da dinâmica de morbidade e mortalidade do câncer não pode ser explicada pelo único esquema do envelhecimento. Por outro lado, parece que de fato a dieta hipocalórica e atividade física moderada são capazes de modificar parcialmente os perfis do aumento de morbidade e mortalidade com a velhice, causando seu deslocamento para as faixas etárias mais avançadas.

Palavras-chave: câncer; dieta; inatividade física.