

## Prevalence of Obesity in a Sample of Schoolchildren from Municipalized Schools in the IX Region of Chile 2008-2009

### Prevalencia de la Obesidad en una Muestra de Escolares de Escuelas Municipalizadas en la Novena Región de Chile 2008-2009

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**SUMMARY:** Obesity is a prevalent disease in Chile. The multitude of cause factors makes it a complex disease and therefore very difficult to treat, since its roots lie in the earliest stages of life. We evaluated pupils from 21 municipalized primary schools, in rural and urban communities from the 10 districts of the IX Region. The sample consisted of 275 subjects in Kindergarten and first year primary school in the year 2008, who were monitored over two years. The results show a trend indicating an increase in the prevalence of obesity in the sample, the difference being statistically significant,  $p=0.000$ . These results show that obesity is increasing, and that more action is needed to slow this disease occurring from early childhood.

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**KEY WORDS:** Anthropometry; Body mass index; Childhood obesity.

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## INTRODUCTION

The World Health Organization (2009) defines obesity as a chronic, multifactorial disease, with numerous complications, produced by a combination of biological, genetic and environmental factors. The most studied are related to lifestyle and physical activity, but the disease is also associated with socio-economic levels, gender, age and ethnicity, making it complex and dynamic (Peña & Bacallao, 2006).

Obesity is characterized by excessive body fat which in Chile (MINSAL, 2004) is diagnosed using the body mass index (BMI) an internationally accepted standard proposed by the World Health Organization (2004a). The cut-off point for child obesity is above the 95th percentile according to the current BMI standard used by the Ministry of Health (MINSAL, 2004b).

According to United Nations Systems (2005), the estimated prevalence of obesity and overweight in schoolchildren worldwide is 2.7% and 7.6% respectively, with figures for obesity which go from 0.2% in Sub-Saharan Africa to 8.2% in the Americas; and from 1.1% overweight in Sub-Saharan Africa.

In North America, Eastern Europe, Middle East, the Pacific Islands, Australia and China, obesity rates have tripled since 1980. In Latin America the figures increase in countries as their economic income increases, e.g. Chile, México, Brazil, Argentina, Perú, Colombia, Guatemala and Bolivia (Peña & Bacallao, 2001, 2005).

Obesity has increased throughout Latin America, especially in urban areas, affecting all age groups, principally women of low socio-economic levels. The factors strongly associated with this increase are changes in diet and a reduction in physical activity, leading to a considerable increase in the risks of insulin resistance, type II diabetes mellitus, cardiovascular disease, high blood pressure and hyperlipidaemia (Uauy *et al.*, 2001).

Nutritional transition processes have occurred in all the world's countries, strongly associated with demography and epidemiology (Popkin, 2001). Nutritional changes are associated with variables such as increased income and urbanization-modernization, leisure, work, the influence of mass media and food marketing (Popkin, 2001; Rivera *et al.*, 2002; Albala & Vio, 2000).

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In Chile, per capita income doubled in the 1990s, but without a corresponding increase in the quality of life or a reduction of inequality, with persisting figures of 20% poverty and 7% extreme poverty. The increased income among the poorest sector was used to purchase high calorie foods, which have a direct effect on personal health (Albala *et al.*, 2002).

Salinas & Vio (2002) mention that Chile has seen very rapid changes in its epidemiological and nutritional profile. From a pre-transitional stage in the 60s, in which infectious and maternal-infantile diseases predominated, it transitioned to a predominance of Non Transmissible Chronic Diseases (NTCDs), vascular accidents and mental health problems by the end of the 80s (Vio & Albala, 2000).

Vio *et al.* (2000) indicate that all the advances achieved by development may have a negative impact on the poor, such as unsuitable foods, sedentarism, and the consumption of tobacco, alcohol and drugs. According to the National Institute of Statistics (Instituto Nacional de Estadísticas, 2003) the 2002 census shows that Chile has 86% urban population, with improved access to basic services, education and health.

Adverse changes in lifestyle determine an epidemiological profile which leads to sedentarism, bad dietary habits and NTCDs. These pathologies, which represent a morbidity and mortality load among adults, are also arising prematurely in the foetal and infantile stages and then increasing throughout life, resulting in the development of pathologies due to malnutrition through excess. For this reason obesity is now recognized as a public health problem (Batista, 2003; Mc Lellan, 2002).

The dietary factor is associated with a new lifestyle, resulting in an increase in energy intake and/or a reduction in energy expenditure resulting in a build-up of fat in the body (Ferreira & Wanderley, 2007; Batista).

Geographical location is a determining factor in the incidence of overweight and obesity in the population, since according to Silva *et al.* (2005) it was found that the BMI of the infantile population of the Precordillera sector of the IX Region presents average values close to overweight, while obesity was 13.4%. These figures are similar to those found by the Ministry of Health (MINSAL) in the national population.

The Planning and Cooperation Ministry (Ministerio de Planificación y Cooperación, 2002) in its article: Situation of infancy in Chile 2000, points to the increased prevalence of obesity in Chile as a continuous problem over time. This

agrees with the findings of Berenson *et al.* (1998) and Jadue *et al.* (1999).

MINSAL (2003) estimates that by 2010 Chile will have 1,300,000 obese children, and shows that there is 25% overweight and obesity in children aged 0-6 y old monitored by the ministry, 35% in pre-school children who attend state Kindergarten (JUNAEB, 2002) 38% in children in 1st year primary school and more than 50% in adults and the elderly.

MINSAL (2009) reports that the prevalence of obesity for children of the same age in the IX Region called "La Araucanía" are approximately 21%. Based on this information, a large increase in the obesity rates have been noted since 2001, approximately 5% during the decade.

A number of studies in Chile have confirmed that obesity implies various risks in the psychological, biological and social ambits of children, leading them into isolation, reduced self-esteem, and affected their personal, family and academic relations, JUNAEB, Albala *et al.* and MINSAL (2004).

Many studies support the association of overweight with metabolic disorders and the risk of developing chronic diseases in adult life (Albala *et al.*, WHO/IDF, 2004).

MINSAL proposed the use of Body Mass Index (BMI) by age as a criterion for the nutritional evaluation of schoolchildren and adolescents, since it is more associated with body composition than the weight for height ratio. Since 2003, this was established as the nutritional assessment criteria in the Technical Standard for nutritional status of children aged 6 to 18 years 2<sup>nd</sup> edition of 2007.

The aim of the present study was to assess the changes in the nutritional status of children in the Region, mainly to test if obesity prevalence is increasing.

## MATERIAL AND METHOD

The study carried out was descriptive, with intentional non probability sampling, evaluating pupils from 21 municipalized general primary schools, in rural and urban communities from the 10 districts of the IX Region. All schools were part of the Global Strategy Against Obesity program (EGO), which focuses on promoting a healthy life. The subjects were 275 pupils from Kindergarten and 1st year primary school in 2008, who in 2009 corresponded to 1st and 2nd year primary school.

We evaluated weight and height variables, which were used to calculate the BMI according to the Technical Standard for the Evaluation of Nutrition of children aged 6 to 18 years of the Ministry of Health dated 2004. Subjects were categorized as below normal weight, normal, overweight and obese. The Body Mass Index (BMI), also known as the Quetelet Index (weight/height<sup>2</sup>) was used.

The subjects were weighed with minimal clothing on a Tanita scale model 2001 W-B with 136 capacity and 200 grams sensitivity, which met the requirements of the

International Society for the Advancement of Kinanthropometry (ISAK). Their height was measured with stadiometer (0.1 cms.) validated by (ISAK).

Nutritional status was classified according to the MINSAL reference standard based on internationally accepted BMI for age table (WHO). Underweight was <10 percentile, normal weight was 10-85 percentiles, overweight >85-95 percentiles, obesity > 95 percentiles.

## RESULTS

Table I. Characteristics of the study sample for years 2008 – 2009 in a sample of 275 Kindergarten and 1st year Primary School (NB1) from municipalized schools in the ninth region, Chile (n=139 male and 136 female in both periods).

BMI	Minimum		Maximum		Average		S.D.		Variance	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
BMI 2008	11.9	12.4	22.0	24.0	17.0 *	17.2+	2.0	1.93	3.0	3.8
BMI 2009	12.2	12.4	24.3	27.4	17.6 *	17.7+	2.5	2.1	4.7	5.2

\*P < 0.000 paired\_ T test + P < 0.000 paired\_ T test

Table II. Nutritional assessment for years 2008 – 2009 in a sample of 275 Kindergarten (transition 2) and 1st year primary school (NB1) from municipalized schools in the ninth region, Chile.

Nutritional Status	Male				Female				Total			
	2008		2009		2008		2009		2008		2009	
	n	%	n	%	n	%	n	%	n	%	n	%
Undernourished	7	5.0	5	3.6	2	1.5	1	0.7	9	3.3	6	2.2
Normal	62	44.4	57	41.0	56	41.2	53	39.0	118	43.6	110	39.6
Overweight	36	25.9	35	25.2	37	27.2	40	29.4	73	26.2	75	27.3
Obese	34	24.5	42	30.2	41	30.1	42	30.9	75	26.9	84	30.9

## DISCUSSION

The epidemiological profile of diseases in Chile has been changing, due to a higher level of scientific knowledge and improved living conditions. This is reflected in a drastic reduction in infant mortality from 125 per 1.000 live births in 1960 to 16 per 1.000 in the 90s and reaching 7.8 per 1.000 today.

However, according to Ministry of Health statistics, the nutritional condition of infantile population clearly constitutes a problem of excessive nutrition. This situation, as happens in many less developed countries is characterized by sedentarism, bad alimentary habits and non transmissible chronic diseases, which originate in the foetal and infantile stages and are exacerbated in adulthood. In a study by Martínez *et al.* (2008), the trend towards obesity continues and gets much higher with increasing age.

It has been shown that schoolchildren in Chile have a high consumption of refined sugar, oils and cereals, and insufficient dairy products, vegetables and fruit compared

to the recommended intake, consistently at different ages (Yáñez, 2000; Olivares *et al.*, 1999; Atalah *et al.*, 1999).

Our study shows that the actions taken by municipalized schools in the IX Region to reduce obesity have not been effective, since analysis of the data for 2008 and 2009 indicates a trend for the BMI to increase by a statistically significant difference. This agrees with the findings of Uauy *et al.*, in school age children.

Prevalence of overweight in the sample for year 2008 was 26.2% and a similar figure 26.9% obesity. The total of these two nutritional conditions shows that 53.1% of the sample have excess body weight. The percentages of overweight and obesity increased 5.1 %, and the overall trend was significant (p=0.000). This increase occurred principally in the incidence of obesity in the sample. The weight increase between the two years ratifies the national trend to an increase, which is related to sedentarism and bad food intake habits in the Chilean population (Albala *et al.*; Kain *et al.*, 2005).

According to Olivares *et al.* (2006) this increase is related with an increase in caloric intake, while Atalah *et al.*, relate the increase in levels of overweight and obesity with low levels of physical activity.

Silva *et al.* (2003) conclude that IX Region presents different geographical conditions to other regions of the country, with a long winter season which encourages physical inactivity and promotes higher energy intake, these risk

factors undoubtedly are partly responsible for the increase in the obesity indices of the infantile population.

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**RESUMEN:** La obesidad es una enfermedad prevalente en nuestro país, siendo sus causas multifactoriales, lo que la hace una enfermedad compleja, por esta razón el tratamiento es difícil de implementar, ya que sus inicios son en las etapas tempranas de la vida. Evaluamos alumnos de 21 escuelas municipalizadas de enseñanza general básica, rural y urbana pertenecientes a las 10 comunas de la Novena Región. La muestra fue de 275 sujetos pertenecientes a kínder y primer año básico del año 2008, seguidos por dos años. Los resultados muestran una tendencia que indica un aumento en la prevalencia de obesidad en la muestra, siendo esta diferencia estadísticamente significativa,  $p=0,000$ . Estos resultados demuestran que la obesidad va en aumento y que se necesitan más acciones para frenar esta enfermedad que aqueja a nuestra población en formación.

**PALABRAS CLAVE:** Antropometría; Índice de masa corporal; Obesidad infantil.

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