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The Instrumental enrichment program (IEP), a proposal educative intervention in eating habits of overweight and obese children

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Abstract
Obesity represents the greatest health challenge in the 21st century, Mexico ranks second in obesity in adults and it has the first place in childhood obesity. Overweight and obesity in children are one of the most important public health problems in the country. Data from the National Health and Nutrition Survey, 2016 reveal that the combined prevalence of overweight and obesity for the group of schoolchildren boys and girls between 5 and 11 years old is 33.2%; which means than 3 in 10 Mexican children have an overweight problem, conditions that favor the development of a multitude of diseases such as diabetes, high blood pressure, dyslipidemias and heart disease, which involves risks to the health of their life's immediate and future. In addition to the high economic cost in health systems, physical inactivity and mainly dietary behaviors are determining factors in the development of excess weight in children. Currently the nutritional intervention programs to stop the problem, have had little promising results so it is important to look for other options. The instrumental enrichment program (IEP) has proven to be a very useful tool as regards the process of assimilation, significance and transfer of information. Therefore, it could be an alternative for the development of programs that modify the eating behavior and healthy habits in the children. The objective of this systematic review was to establish the Instrumental Enrichment Program (PEI), as a proposal for intervention in eating habits of overweight and obese children.

Keywords: childhood obesity, feeding behavior, cognitive modifiability, instrumental enrichment program

Introduction

Obesity is a multifactorial disorder defined as an abnormal or excessive accumulation of fat, resulting from an imbalance between ingestion and energy expenditure in which etiopathogenesis are genetic, metabolic, psychosocial and environmental factors involve (Reilly, 2006) [25]. Genetic factors govern the ability or facility to accumulate energy in the form of tissue fat and less easily released in the form of heat or energy, is produced because in the long run the energy expenditure of the individual is lower than the energy ingested, this means there is a positive energy balance (Cole, Bellizzi, Flegal, & Dietz, 2000) [3].

Genetic factors are associated with external conditions such as dietary habits and sedentary lifestyles, related to food availability, social and cultural structure involved in the regulation mechanism of energy expenditure and storage (Castillo & Romo, 2016) [2].

Several studies have established that if both parents are obese the risk for children to develop overweight and obesity increases from 69 to 80%; when only one of the parents is obese the risk will be 41 to 50% and if none of them is obese the risk for the children will be only 9% (Dura Travé & Sánchez Valverde, 2005) [7]. On the other hand, children spend a lot of time on television, videogames, social networks and the Internet and this moves them away from the practice of sports and outdoor games contributing to a sedentary lifestyle. This conditions increase the excessive gain of weight (Ebbeling, Pawlak, & Ludwig, 2007) [8].

Thus, in order to develop obesity, the combined effect of genetic predisposition to this disorder and exposure to adverse environmental conditions are necessary. Under these environmental conditions, eating behavior and lifestyles play a key role for children to develop an increase of weight (Zayas, Chiong, Díaz, Torriente, & Herrera Arguelles, 2002) [31].

The alimentary conduct is the set of actions that establish the relation of the human being with the food. It is generally accepted that eating behaviors are acquired through direct experience with food, by imitation of models, food availability, social status, affective symbolism, and cultural traditions. In addition to social influences and shared family environment, they have a relevant impact on the pattern of ingestion, overweight and obesity (Dominguez, Olivares, & Santos, 2008) [6].

Therefore, it is necessary to have methods that allow the development of intervention programs that help to modify these feeding patterns in children.

Epidemiological Overview

Obesity as a current health problem, it has been described as the 21st century epidemic, this epidemic is increasing progressively in both developed and developing countries and in all age groups. In Latin America, there has been a tendency to increase overweight and childhood obesity, becoming a relevant problem for public health (Dominguez, Olivares, & Santos, 2008) [6].

According to data from the International Association for the Study of Obesity it is estimated that approximately one billion adults are currently overweight and another 475 million are obese. Likewise, 2.8 million people worldwide die every year because of overweight or obesity (CONACULTA, 2010) [4].

Mexico is experiencing a transition characterized by an unprecedented increase in overweight and obesity, affecting urban and rural areas, all ages and different regions. The increases in the prevalence of obesity in Mexico are among the fastest, documented at the global level (Rivera Dommarco, 2012) [27].

The prevalence of overweight and obesity in Mexican children has grown at an alarming rate in the last decade. The results of the 1999 National Nutrition Survey and the National Health and Nutrition Survey (ENSANUT, 2012) [9] shows that during this period, in the school-age population, overweight went from 26.9% to 34.4%, which means that in 13 years the problem increased 28%, 0.6 percentage points (2.1%) per year (ENSANUT, 2012) [9]. The prevalence of overweight and obesity in Mexican schoolchildren (5 to 11 years old) has grown at an alarming rate in the last decade. The results of the National Nutrition Survey of 1999 and the National Health and Nutrition Survey (ENSANUT, 2012) [9] show that during this period, in the school-age population, overweight went from 26.9% to 34.4%. Means that in 13 years it increased 28%, 0.6 percentage points (2.1%) per year (ENSANUT, 2012) [9]. The ENSANUT 2016 [10] report a prevalence of 33.2% in this age group, although a decrease compared to the data obtained in the survey of 2012, where the prevalence was 34.4%, is still an alarming figure, since 3 of every 10 children are overweight or obese (ENSANUT, 2016) [10].

Overweight in children today represents one of the most serious problems facing public health, mainly because obesity is a risk factor for several chronic conditions, whose care and treatment requires high financial costs, in addition, the epidemiological impact it is a direct result of a correlation between weight in childhood and weight in adult life, in this sense, the detection and early attention of childhood obesity is important because it is the best time to avoid the progression of the disease and the morbidity associated with it (Fernández, Montoya, & Viguri, 2011) [12].

There is evidence that body mass index elevated is an important risk factor for non-communicable diseases, such as cardiovascular diseases (mainly heart disease and stroke), diabetes, locomotor disorders (especially osteoarthritis), and some cancers endometrium, breast and colon), childhood obesity is associated with an increased likelihood of obesity, premature death and disability in adulthood. Depending on age and ethnicity, obesity is associated with a decrease in life expectancy of 6 to 20 years, and even people with severe obesity die 8 to 10 years earlier than normal weight, as do the smoking rooms. It is estimated that every 15 extra kilograms increase the risk of early death by approximately 30% (Franco, 2010) [17] (Moyer, 2012) [21].

Economic Cost

A study conducted by the Children's Hospital of Mexico in 2006 developed a hypothetical cohort of 15'487,852 children between 5 and 11 years of age and created a mathematical predictive model based on current prevalence in order to estimate the economic and health burden of obesity in Mexican children during the years 2006-2050, the results of that study was that in 2015 the first cases of diabetes mellitus 2 and of arterial hypertension would be present (this is already happening). When the first group of children reach 40 years of age, the complications of obesity will increase considerably. By 2050, 67.3% of the cohort will be obese and the cost of obesity care will be 57 thousand 678 million pesos (Garduño, *et al*., 2008) [19].

The study presented is conservative because only two of the main complications of obesity were calculated: diabetes and hypertension. The results of this study provide an overview of the long-term effects that childhood obesity might have on the population to follow this growing trend (Garduño, *et al*., 2008) [19].

The new obesity and prevention economics (OECD) report says that prevention programs could annually avoid 47,000 deaths in Mexico and adds that a program of advice to obese people by doctors would lead to an annual gain of more than 150 thousand years of life with good health (Rivera, Hernández, Aguilar, Vadillo, & Murayama, 2013) [26].

Most prevention programs in Mexico would cost less than 3.5 billion pesos a year, and chronic disease costs would cut about 3,900 million pesos per year, according to estimates by the same organization (Calzada, 2003) [1].

The Multidisciplinary Obesity Group of the National Academy of Medicine estimated that the cost of obesity in Mexico was 67 billion pesos in 2008 and it is estimated that by 2017 it will fluctuate between 151 and 202 billion pesos. If it does not act immediately, the cost that society will pay in the next three decades will be much greater than the investment required to implement these actions (Calzada, 2003) [1].

Risk Factors

The most important risk factors to cause obesity in infants are mainly social and cultural factors (since unhealthy weight results from the influence exerted by the environment and the consumption of foods with high energy density), sedentary lifestyle, excess of hours in front of television, eating behavior, eating habits, hormonal factors, high birth weight, among others (SS, 2010) [29].

The country faces a nutritional transition for some decades characterized by a westernization of the diet, specifically: 1) increase in the low cost availability of processed foods added with high amounts of fats, sugar and salt; 2) increase in fast food consumption; 3) decrease in the time available for parents to prepare food at home; 4) significant increase in advertising exposure and supply of processed foods; and 5) significant decrease in the physical activity of the population (Peña Cruz, 2012) [23].

The amount of information and the use of visual and auditory marketing in the different media also play an important role in the preferences or tastes of individuals. A report made by the Ministry of Health mentioned that a Mexican child sees on average 61 ads a day, that is, 22 thousand 265 messages a year, of which 42% is related to the consumption of foods that promote obesity (Rivera Dommarco, 2012) [27].

In terms of caloric expenditure, children and adolescents do not play in open spaces, due to the reduced living space and the insecurity of the environment, and instead, they watch television, play video games or use the computer, activities in which they invest four or more hours a day, with the consequent accumulation of calories due to inactivity. In schools there is also the lack of specific places to exercise, and this has been a trigger for weight gain (García & Garibay, 2012) [18].

Early Intervention on Risk Factors

Environmental factors play a key role in increasing the incidence of obesity in both developed and developing countries. Regarding dietary behavior, although total caloric intake in childhood has not been substantially modified, its composition has varied greatly due to the greater availability of industrialized foods high in fats and simple sugars (O´Donnell, *et al*., 2004) [22].

Dietary behavior and decreased physical activity are likely to be the possible environmental factors of intervention, through programs for the prevention and treatment of obesity during childhood. Based on this epidemiological context, it is that preventive interventions reach a preponderant place; focusing on the daily management of eating and behavior changes (Datillo, y otros, 2012) [25].

Cognitive Modificability Theory

Reuven Feuerstein is a Romanian pedagogue and clinical psychologist. In 1944, he emigrated with his family to Israel, where he was a remarkable boy due to his prodigious intelligence and his ability to understand the biblical writings [23]. Because of this ability, many parents began sending their children who had learning difficulties to him, so Feurstein began his interest and work to modify cognitive levels in children who had severe resistance to acquire complex learning such as reading (Feuerstein & Richelle, 1963) [13].

Dr. Feuerstein's work is evident from the hundreds of thousands of people who have studied his theories and programs, his pioneering work in developing models of dynamic procedures for evaluation and intervention to improve learning have spread throughout the world; In addition, for proposing one of the first systematic attempts to develop a cognitive paradigm of enrichment, which in the last 40 years has been used in many countries (Feuerstein & Richelle, 1963) [13].

The theory of structural cognitive modifiability is based on the principle of modifications that can be produced in the personality, the way of thinking, the level of global adaptation of the individual in a conscious and permanent functional level, that allow him to adapt to the conditions around him and the problems of this. Cognitive: refers to the processes where they are perceived "input" (Input or reception of the information processed by the individual), elaborated and communicated "output" (output or response given by the individual, after processing in information processing), information for the individual, being basic prerequisites of intelligence where are contained the cognitive functions that direct the ability of the individual to make use of their experience already lived (acquired learning) in the adaptation of new situations that, even, can lead to greater complexity [24]. Structural: because it is a global and integrated system constituted by interconnected and mutually independent elements, characters of the mental structure, which themselves influence, order, moderate and affect each other, product from a cognitive input dysfunction, elaboration or output, alterations in the cognitive system constituting the mental operations of intelligence indispensable to all kinds of learning (Feuerstein, Rand, Hoffman, & Miller, 1989).

In school age the teacher, as in a certain moment must have been the mother, must be the subject that fulfills the role of filter between the world and the child 1- the mother, and then 2- the teacher, act as mediators facilitating the child and young person access to the cultural, scientific, historical, moral and social world (Feuerstein, Rand, Hoffman, & Miller, 1989).

It is therefore of great importance to foster individuals of great human quality; for the responsibility and role they will play as social mediators. But in addition to providing them with progressive access to knowledge, teachers must be able to promote adaptive strategies that enable them to confront this globalized world that is rapidly undergoing rapid changes. What it is, finally, is to create a type of intelligence that adapts quickly to the changes of the modern world and that, in a progressive way, the individual himself has the ability to adapt and assume the current challenges presented without hinders (Feuerstein, Rand, Hoffman, & Miller, 1989).

The Instrumental Enrichment Program [IEP] of the theory of cognitive modifiability proposes that, through pedagogical tools, teachers or tutors reprogram the children's cognitive capacities, favoring the learning process and how they react and act on it, it is a tool that helps the child make decisions and adapt to their environment, so it can be an alternative to change habits (Feuerstein, Rand, Hoffman, & Miller, 1989).

Feurestein's theory of structural cognitive modifiability aims not only at partial changes in the improvement of cognitive and behavioral skills in individuals, but rather an integral and structural modification in the life of these (Feurerstein, Rand, & Feurerstein, 2005). Feurestein bases his theory on what he denominates Autoplasticity, where the most important element is the educational factor, by means of Autoplasticity the teacher (firstly the parents and later the teachers) besides providing the access to the knowledge, he must be able to forge in the children adaptive strategies that allow them to face the world, which means, to create a type of intelligence that adapts quickly to changes, and that allows the individual to have the ability to solve the challenges in a progressive way without difficulty (Falik & Feuerstein, 2013) [11].

The instrumental enrichment program (IEP), is the material or tool resulting from the systematization of the principles of the theory of cognitive modifiability. The program will be presented by the teacher or mediator teacher, who through a series of exercises and tasks tries to improve cognitive and operational deficiencies in the teaching – learning process, specifically in the entrance, process and exit, or the assimilation / signification and transfer of information which are crucial aspects that dictate how the individual perceives the information of the world and acts accordingly (Rand & Feuerstein, 1982) [24].

The program consists of 14 instruments specially designed to rehabilitate cognitive functions and intervene in the development of intentionality, meaning and transcendence skills, individuals who learn to think and understand the meaning of the process of assimilation, meaning and

transcendence of basic cognitive skills, individuals who develop language proficiency competencies, understanding of phenomena, analysis and resolution of situations or problems, therefore, individuals who present a higher academic, intellectual performance, and a notable improvement in self-confidence and self-esteem (Feuerstein, Rand, Hoffman, & Miller, 1979) [14].

Aim

Establish the Instrumental Enrichment Program (PEI), as a proposal for intervention in eating habits of overweight and obese children

Discussion

Although the priority problems in public health in Mexico are overweight and obesity and these represent the prelude to other health problems, including diabetes mellitus type 2, arterial hypertension, cancer, cerebrovascular and cardiovascular problems, deepen in the battle from a preventive perspective in public health to search through scientific research including research projects since the implementation of the Instrumental Enrichment Program [IEP] based on the Theory of Cognitive Modifiability [TCM] from the design of instruments according to the contextual needs of the Mexican reality and from interculturality, allows us to establish the proposal of this methodology to look for strategies that seek to positively impact people living with diabetes anticipating this disease and its complications by addressing the challenge of reversing priority problems health p Republic in our country, without forgetting what has already rightly cited in his thesis.

"Two major problems of education correspond to the low quality of the teaching-learning process and educational inequality; the first one must involve the student and the teacher in the construction of knowledge, the development of skills-competencies, abilities, skills, as well as attitudes and values, which guarantees active participation in their social process, their community and their country's development. For this reason, professionalization of the teacher is required, an innovative update for the construction of knowledge. Starting from this implication of education as a transforming the thought process "(Gonzalez Panduro, 1999) [20].

In the same way Ruvalcaba *et al*, (2013) [28] already pointed out that. "The proposal is to apply this pedagogical theory in the teaching of biology or the rest of the knowledge areas, it is essential that the teacher specializes in this pedagogical area to face the challenge, change in their cognitive structures, encourage themselves to provoke the questioning and mediation changes in learning, in the teaching of biology and public health that seek to generate, in turn, changes in healthy life behaviors, positively impact in cases such as the education of the person with diabetes or other emerging health problems " (Ruvalcaba Ledezma, Cortés Ascencio, & Jimenez Mora, 2013) [28].

The above denotes that the teacher must assume the commitment of pedagogical professionalization in terms of guiding the course of health promotion and education to abolish the main public health problems in our country and therefore stop resisting the changes in education, where the central axis is an education that allows thinking, knowing how to question and question their reality, this is tied with what Ruven Feurtein pointed out (Velarde Consoli, 2008) [30].

"The theory of Cognitive Structural Modifiability of Reuven-Feuerstein explains that the teacher is the main agent of change and transformation of poor structures of students with learning difficulties; for this, it must be equipped with cognitive, methodological and humanistic ethics training. The program is based on the principle of cerebral autoplasticity and allows the subject to adapt and catch up with the changes, preparing him to face the challenges of the globalized world. The Instrumental Enrichment Program consists of fourteen instruments designed to modify some function or cognitive deficiency; seeks to modify the self-perception that the subject has and provide radical optimism about its possibilities for change and improvement (Velarde Consoli, 2008) [30].

Hence the importance of applying this theory in the teaching-learning process of biology and public health sciences to direct the transformation of thought and socio-environmental reality to so many problems that threaten our globalized world. This means, that the knowledge of the social context is fundamental for the design of strategies that impact on public health, recognizing the culture, their needs, their illnesses in order to fulfill the duty of offering the possibility of health services (Velarde Consoli, 2008) [30] and, evidently, to provide education of quality, which allows the construction of knowledge and with this, in turn, social development and improvement in their quality of life.

The above agrees with what Ruvalcaba *et al*, (2013) [28] pointed out. "It also requires changes in teaching methods by educators from the design of public policies aimed to generate a student who thinks and builds the knowledge in his class, which, in turn, allows to educate and to develop thinking skills, the development of applicable competencies in research, where questioning and mediation are the center of the teaching action and also linking education and health from the constructivist approach applied in biology, so that in a future research biological impact with better effects in the generation of a new public health. Quality education promotes population development, which is required to start from the application of pedagogical models from the constructivist approach where knowledge is built and collaboration is stimulated, for example, group collaborative learning, project work, teamwork and the applications of theories such as cognitive modifiability, from which the generation of awareness of their learning and their environmental environment is promoted, thus promoting the constant improvement in styles and quality of life "(Ruvalcaba Ledezma, Cortés Ascencio, & Jimenez Mora, 2013) [28].

Conclusions

Child obesity in Mexico is a priority on the agenda of public health problems. Due to the increase in the prevalence of chronic degenerative diseases in the population, the decrease in the quality of life in the short and long term, in addition to the enormous economic expenditure that represents for the health system. The current situation of overweight and obesity in Mexico requires implementing a comprehensive, multisectoral and effective coordination policy to achieve changes in the patterns of food and physical activity that focus on prevention, early intervention is the most Indicated, the programs that are currently implemented have not had the expected impact, as they fail to change the behavior of children in terms of food and

healthy habits, since nutrition education does not focus on cognitive modification.

The Instrumental Enrichment Program [IEP] of cognitive modifiability has been shown to improve learning abilities and process information, having an impact on the individual's way of thinking and acting in the circumstances and problems of the environment in which he or she develops.

Therefore, the instrumental enrichment program focused on cognitive modification in the habits of children is an alternative that can have benefits when developing tools that allow the individual to make healthier decisions regarding habits and consumption of food, which would have a great impact on their quality of life.

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