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ORIGINAL

CHRONIC DISEASE IN PHYSICAL EDUCATION

LA ENFERMEDAD CRÓNICA EN LAS CLASES DE EDUCACIÓN FÍSICA

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ABSTRACT

An observational and descriptive study of the epidemiology of chronic diseases in Physical Education classes in secondary education was carried out. It was conducted in 36 educational centers of the Autonomous Community of Madrid (Spain), in 4.527 students, from 2003 to 2009. A questionnaire was used as data collection techniques.

It revealed that a large number of students showed at least one chronic disease (53.19%) with a large amount of those suffering from multiple medical conditions (21.06%). The most prevalent illnesses include visual disturbances and eye diseases (44.37%), allergies (16.37%), misaligned teeth (8.61%), asthma (8.49%), scoliosis and kyphoscoliosis (6.29%). The most important chronic pathologies show a "prevalence pattern" which includes the previously mentioned diseases.

The most common diseases in the analyzed chronology are compatible with the performance of the Physical Education lesson, but they may undermine its development if ignored.

KEY WORDS: Chronic disease, Physical Education, Secondary Education, Students.

INTRODUCTION

There is growing interest within the education sector in the chronic character of pathologies regarding the treatments and normalization of the students affected by this type of diseases. This approach is supported by the World Health Organization (WHO) including the chronic diseases on the health priorities table. Adaptation to reality, wellbeing, students' survival and related psychological issues make it possible for the teachers to find tools in this field for the improvement of their teaching work. A high representativeness of students affected by chronic diseases from different origins and with different treatments as well as development is seen within schools in Physical Education classes. Therefore, the cases of students with chronic diseases need to be identified and recorded in order to improve the function, life quality and learning in an inclusive educational atmosphere.

Despite the disparity of the figures, in the different studies about the prevalence of chronic diseases in young people due to their initial conception and area of application, they usually vary between 5% and 35%. There are various relevant studies coming from the USA, where the National Health Interview Survey revealed that 44% of children under 17 with chronic diseases that restricted their daily activities and the Ontario Child Health Study whose results showed a prevalence of 18.1% of chronic diseases for a population aged between 4 and 16. Other authors who focused their work on this country reveal a prevalence close this last study with a prevalence of 18% for individuals aged between 0 and 20.

The National Survey on Spanish Health 2006 reveals 3.75% of the population aged between 10 and 15 with some type of chronic disease. In Spain, the number in of children and teenagers with chronic diseases has grown in the last years reaching figures of between 10% and 20%. In a previous study based on students aged between 14 and 19, we found that 50% of the students had a type of pathology. Moreover, 7.8% of the males affected and 21.4% of the females affected had two or more chronic diseases. The following prevalence of diseases is highlighted: eye diseases 49.41%, respiratory diseases 25.29%, osteoarticular and connective tissues diseases 12.94%, hematologic diseases 2.94%, endocrine, metabolic and nutritional diseases 2.35%, heart murmur 1.76% and unspecified cardiac disturbances 0.58%.

Eiser presents the most prevalent diseases during infancy through incidence data in the USA: asthma 2%, epilepsy 1%, heart diseases 0.5%, cerebral palsy 0.5%, bone diseases 0.5% and diabetes mellifluous 0.1%. Newacheck and Taylor, using the data from the National Health Interview Survey, produced national estimates of the prevalence of chronic medical conditions in children in the USA. They revealed a representativeness of 31% of children chronic patients. The most representative diseases were as follows: respiratory allergies 9.7%, repetitive ear infections 8.3% and asthma 4.3%.

Despite these sources, there is a downward trend as regards official records of children and teenagers with chronic disease. This might be one of the reasons why there is an absence of specific research projects on the lack of attention to the demands that young people with chronic diseases may present at school.

Considering these circumstances, the aim for this study is geared towards the discovery of chronic pathologies found in PE students secondary education in educational centers of the Autonomous Community of Madrid and the description of its quantitative chronological development.

MATERIAL AND METHODS

A total of 4.527 students aged between 12-17, from 39 high schools (except the second year of baccalaureate) in the Autonomous Community of Madrid who were having the PE subject were analyzed (2.202 boys 48.64% and 2.325 girls 51.36%).

The annual distribution of the sample was performed as follows:

Year	Population According to the Office for Statistical Studies of Madrid (2001).	Grade	Sample	Schools	Groups
2003	52482	1st secondary	769	33	33
2004	62629	1st Baccalaureate	744	30	33
2005	52482	1st Secondary	583	25	25
2006	59359	4st Secondary	241	6	11
2007	56613	3st Secondary	687	26	29
2008	59359	4st Secondary	597	24	24
2009	62629	1st Baccalaureate	906	36	39

This is an observational and descriptive study of the epidemiology of chronic diseases, whose data collection technique was based on the nominal questionnaire for students which was put forward by the research team AFES-UAM of the Autonomous University of Madrid.

The WHO ICD-10 classification was used in order to classify and catalogue the pathologies found in this study. The computer software Excel (database for recording findings and creating graphs) was used to process the resulting data.

Once the most prevalent chronic diseases had been reviewed, the study essentially focused on the chronological series by direct comparison of the frequencies of these diseases in the different years of the study.

RESULTS

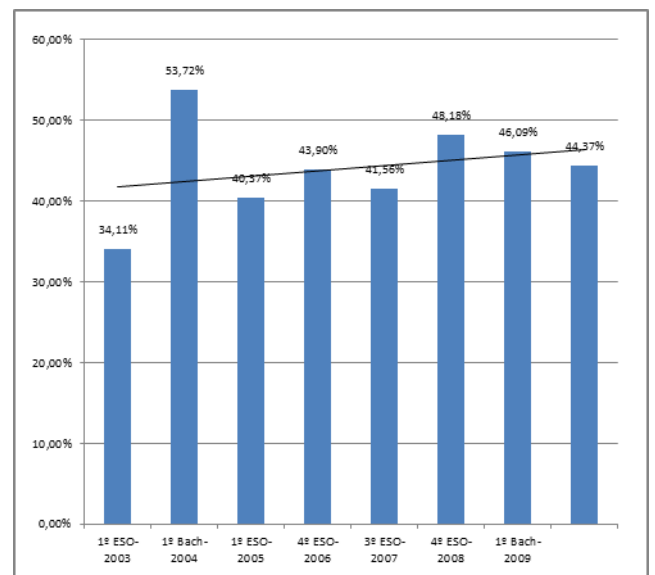
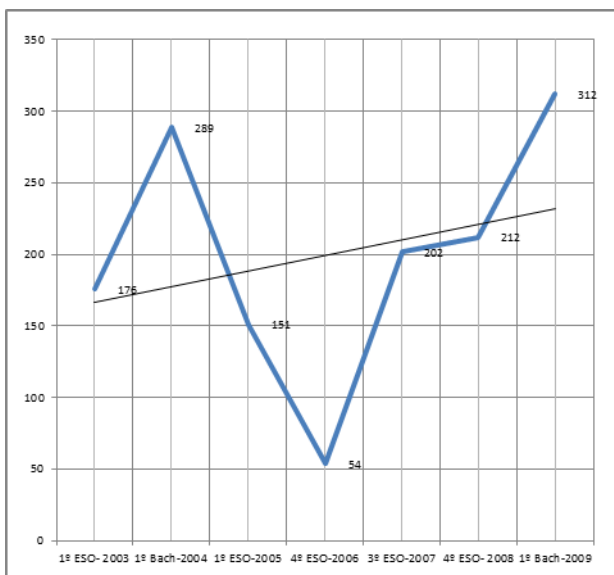
The table below shows absolute and relative frequencies of the chronic diseases found as the highest classified frequency according to the ICD-10.

TABLE 1. Chronic pathologies with the highest frequencies

PATHOLOGIES	1 st Sec-2003	% 1 st Sec-03	1 st Bac-2004	% 1 st Bac-04	1 st Sec-2005	% 1 st Sec-05	4 th Sec-2006	% 4 th Sec-06	3 th Sec-2007	% 3 th Sec-2007	4 th Sec-2008	% 4 th Sec-08	1 st Bac-2009	% 1 st Bac-2009	TOTAL--	% TOTAL
H59 Eye disturbances / Eye diseases and their derivatives	176	34.11 %	289	53.72 %	151	40.37 %	54	43.90 %	202	41.56 %	212	48.18 %	312	46.09 %	1396	44.37 %
T78.4 Allergy	86	16.67 %	73	13.57 %	58	15.51 %	19	15.45 %	94	19.34 %	55	12.50 %	130	19.20 %	515	16.37 %
K00 Developmental disorders of the teeth or/and tooth eruption (Misaligned teeth)	63	12.21 %	29	5.39 %	68	18.18 %	10	8.13 %	18	3.70 %	40	9.09 %	43	6.35 %	271	8.61 %
J45 Asthma	46	8.91 %	40	7.43 %	31	8.29 %	10	8.13 %	59	12.14 %	23	5.23 %	58	8.57 %	267	8.49 %
M41 Scoliosis or Kyphoscoliosis	28	5.43 %	55	10.22 %	19	5.08 %	7	5.69 %	28	5.76 %	23	5.23 %	38	5.61 %	198	6.29 %
M24.2 Ligamentous laxity	8	1.55 %	20	3.72 %	12	3.21 %	7	5.69 %	14	2.88 %	4	0.91 %	3	0.44 %	68	2.16 %
M21.4 Flat feet	19	3.68 %	6	1.12 %	5	1.34 %	0	0 %	15	3.09 %	6	1.36 %	16	2.36 %	67	2.13 %

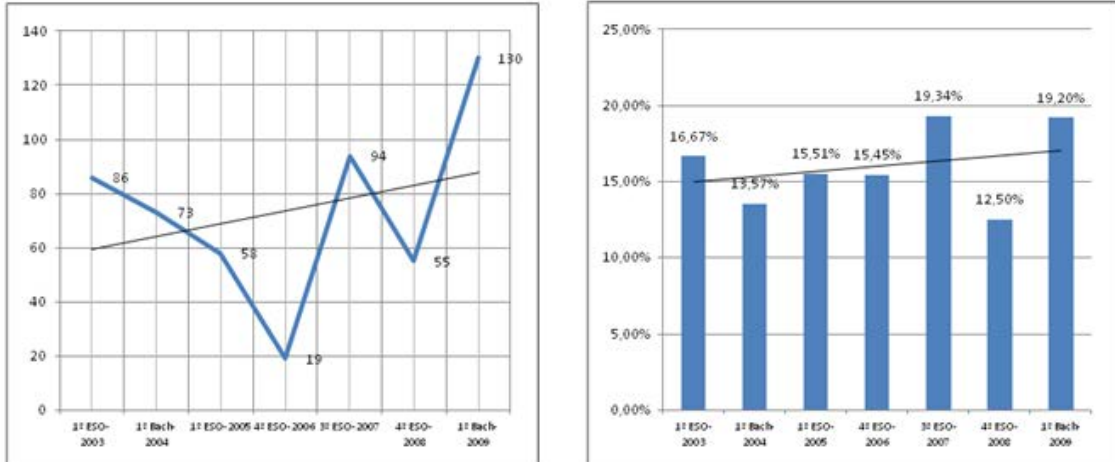
The following graphs reveal the subsequent frequency of these diseases in each annual subsample in absolute and relative figures.

Graph 1. Eyesight disturbances/diseases and their annexes in each annual subsample.



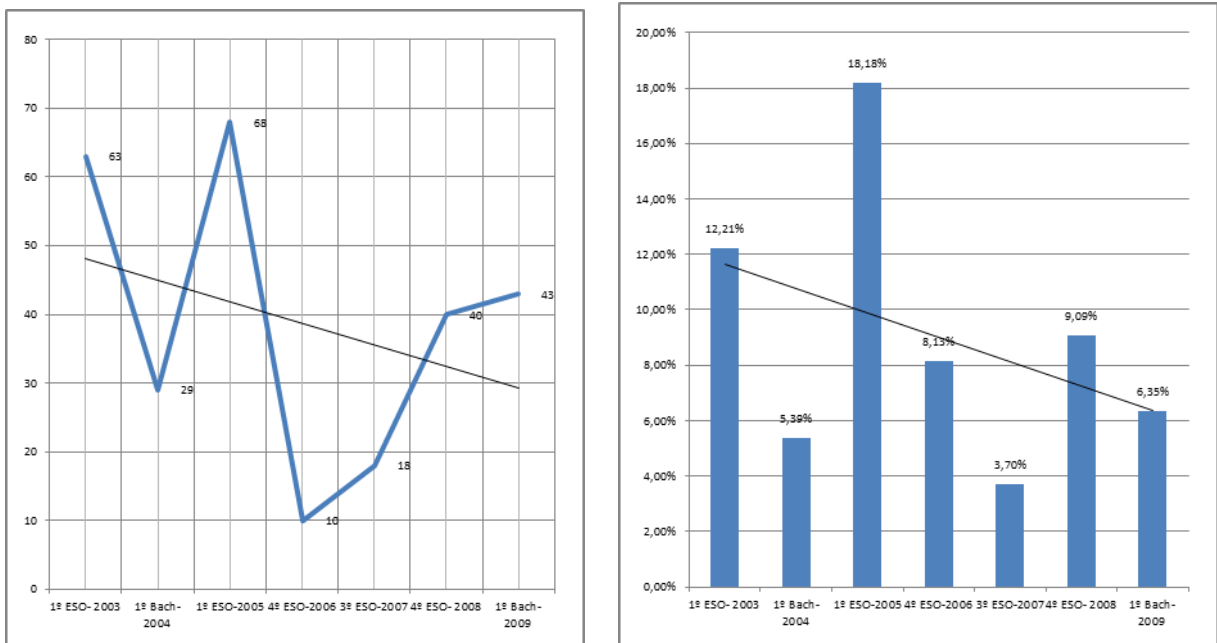
A slightly growing trend only in the year 2004 can be noted. A high prevalence above the rest of the years is noticed in the 1st year of baccaulaureate. On the whole, the data remain around 43%.

Graph 2. Allergies in each annual subsample.



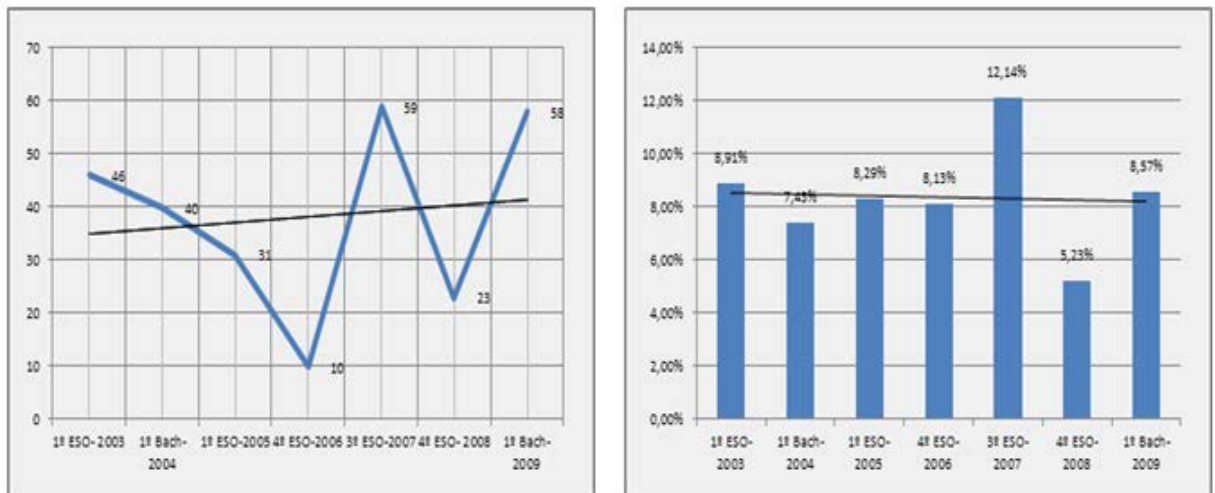
The same situation is observed in the case of allergies. A slight growing trend can be seen, which are below 15% in the 1st year of baccaulaureate in 2004 and in the 4th secondary grade in 2008. The figures fluctuate around 13%.

Graph 3. Misplaced teeth in each annual subsample



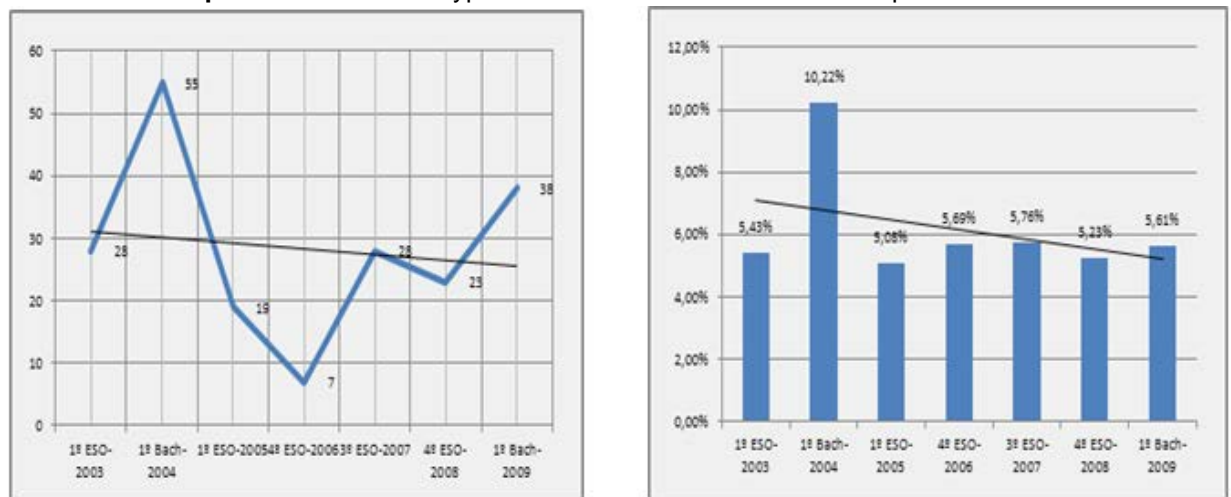
As regards misplaced teeth, the trend is clearly downward, moving from 12.21% in 2003 to 6.55% in 2009, albeit with a remarkable peak in 2005 corresponding to the 1st secondary grade and a fall in prevalence in 2007 corresponding to the 3rd secondary grade.

Graph 4. Asthma in each annual subsample.



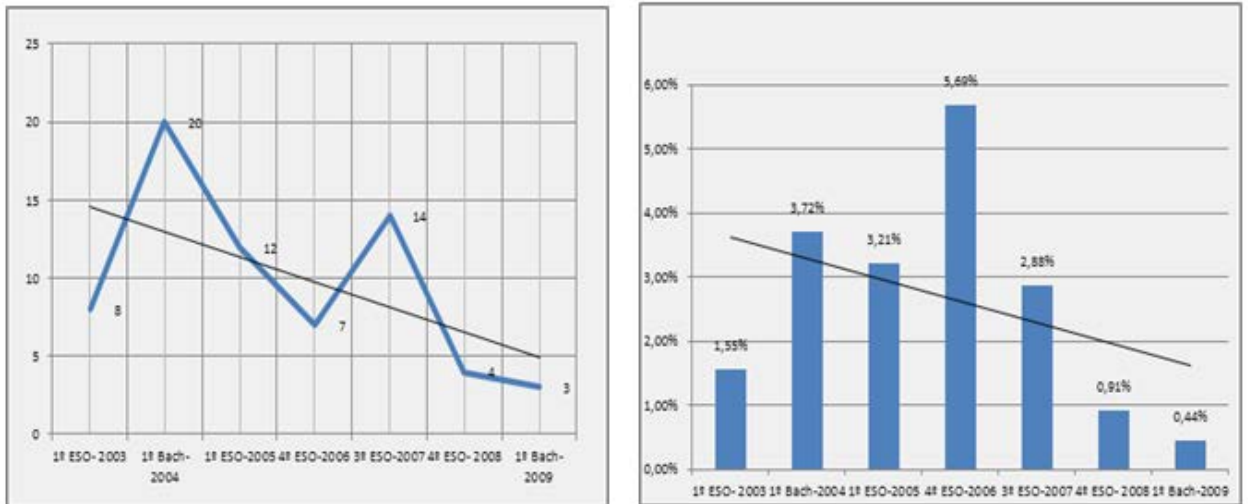
Asthma practically remains at 8% except for the year 2007 in the 3rd secondary grade, where it grows up to 12.14%.

Graph 5. Scoliosis and kyphoscoliosis in each annual subsample.



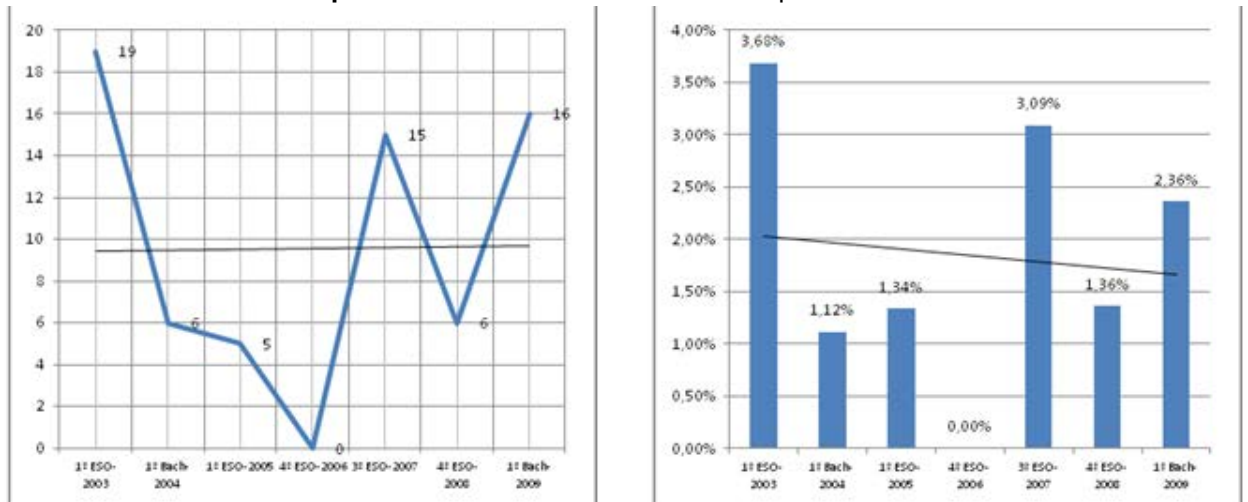
Scoliosis and kyphoscoliosis practically remain at 8% but with a high prevalence in 2004 of 10.22%, which makes the trend appear to be falling.

Graph 6. Ligamentous laxity (joints) in each annual subsample.



The figures for the ligamentous laxity show a clear downward trend moving from 3.72% to 1.55%. The high prevalence in 2006 and the low prevalence in 2003, 2008 and 2009 need to be stressed out.

Graph 7. Flat feet in each annual subsample.



Regarding flat feet, an completely irregular trend is noted from the 19 cases identified in 2003 to none in 2006.

DISCUSSION

The first aspect to point out concerns the lack of data on specific (psychological, neurological, dermatological...) diseases and the fact that they are voluntarily mentioned by the students. Neither was a research on etiology carried out.

A variability of high figures is found when comparative estimates in contrast to other prevalence studies of chronic diseases are carried out. There is an absence of research projects with a chronological evolution of prevalence for both general pathologies as well as specific real diseases.

The figures in connection with eye diseases should be taken into account due to their relevance. The representativeness of that disease has always been above 40% of the students in all grades, whose highest figure was obtained in the second year (1st year of baccalaureate in 2004) when 289 cases were identified, which represents 54% of the students. The average representativeness of these pathologies rises up to 44% of the students. The trend shows a progressive growth, whose causes need analyzing and which needs to be stopped. As regards eye disturbances and diseases, some discrepancies with other studies, owing to the lack of these medical conditions in their findings (they do not mention them), are noticed. Other authors rank this type of pathologies very highly giving sensory diseases a remarkable significance without, however, reaching 44 of every 100 students on average showed in the results of this study. Thus, there are different figures of 19-20%; 25%; 28.52% or 49.41% according to the various authors. There are also national authors who suggest figures of 25.7% of prevalence between the students aged 9-19. If not stressed out in the PE class, these pathologies may involve problems during the learning process, frustration in the performance of motor tasks and possible accidents. In spite of the frequency found, the severity of these conditions may be considered to be usually low and of rather easy solution through eyesight correction (glasses or contact lenses).

The second most important pathological group concerns allergies with a representativeness between 13% in 2008 in 4th secondary grade and 19% in 2007 in 3rd secondary grade. The average representativeness has been 16% of the students in the annual subsamples that were part of the study. The trend proved an increase in this type of diseases. A high discrepancy is perceived between the studies in connection with this research (16 of every 100) and between them. An allergy representativeness of 39%, 9.7% or 13.68% may be pointed out. These pathologies in physical activity hold a minor interference provoking discomforts if the allergen is present at the practice site. It is recommended that teachers should check the presence of allergens that may affect their students and carry out the necessary adaptations. These deficiencies, according to some authors, may lead to an important fall in the school learning performance, truancy and loss of life quality.

The third most representative group concerns misaligned teeth and dental developmental disorders (9% of the students). There is a greater fluctuation in the figures in their chronological evolution with a range of prevalence from 1st secondary grade in 2005 with 18% of the students and 3rd secondary grade in 2007 with 4%. The average prevalence of these diseases equals 9%. The trend shows a steady regression in their chronological evolution. Despite a significant lack of specific studies on misaligned teeth, figures of 2.62% or between 12.21% and 5.43% are published. The figures revealed in our study may indicate the fact that these diseases are checked and corrected in the years preceding dental development. There are, therefore, less possibilities of mouth injuries due to the use of fixed dental appliances during sport practice.

Following these conditions, asthma comes out as a disease whose figures are not alarming but quite striking, fluctuating between 5% found in 2008 with the 4th secondary grade and 12% in 2007 with 3rd secondary grade. The average

prevalence reaches 8%. The trend for this disease reveals stability. Although the authors attribute a significant relevance to asthma, they fail to reach a consensus about its representativeness. Some of them treat this disease as the most important with 2%, 2.4%, 4.3%, 8.87%, 10%, 15% in the Community of Madrid growing up to 16.5%. An adequate education and some adaptations for physical activity are necessary for the students suffering from this pathology.

Problems associated with spine curvature such as scoliosis and kyphoscoliosis appear with a slight negative and chronological progress inclination in its representativeness, which is highlighted by a high prevalence in 2004 in the 1st year of baccalaureate with 10% and with the other subsamples showing equality! where all of them remain above 5% of the students. Some spine curvature pathologies (spine scoliosis and kyphoscoliosis) reveal the following figures in this study: 38% or 50.9% in children and 69.3% in girls. Such a finding is important because it indicates that the students' musculature is balancing the system and that they have performed less negative tasks for the spine stability such as the overload as well as the wrong attitudes and movements. This could result from the correct physical formation since childhood, the avoidance of overloads and the prohibition of work in children.

The ligamentous laxity and flat feet are other minor medical conditions identified, which are found in 2% of the students on average in both diseases and where no subsample of more than 20 individuals was found. The ligamentous laxity trend falls steadily whereas that of flat feet shows a more moderate negative inclination. This finding could not be compared with other studies. This case resembles the spine and is important because of its involvement in the locomotor system since a good Physical Education and strengthening of the muscles surrounding the loose joints prevent these pathologies.

The detection of medical conditions in students, which have so far remained unknown by them and their families, may be part of the teacher's function and become a highly valuable source of information for the PE classes. Therefore, PE teachers take on the role of health agents in coordination with the medical staff in the detection of chronic pathologies.

To sum up, the most prevalent diseases both in the general sample and the annual subsamples were always the same, hence creating a "prevalence pattern". The diseases that formed this group are the eyesight disturbances and diseases, allergies, misaligned teeth, asthma, problems associated with spine curvatures and, to a lesser extent, ligamentous laxity and flat feet.

PREVALENCE PATTERN	
Eye disturbances and eye diseases	43.99 % \pm 2.36
Allergies	16.03 % \pm 0.98
Misaligned teeth	9 % \pm 1.85
Asthma	8.38 % \pm 0.78
Scoliosis and kyphoscoliosis	6.15 % \pm 0.69

Figure 8. Prevalence pattern of chronic diseases in teenagers in the Community of Madrid, 2000-2010 (Spain)

If this prevalence pattern varied significantly in any center, the causes should be investigated.

Would a decrease mean less diseases or less diagnosis? If it was a decrease of the disease, what are the causes? Would an increase mean greater medical control and more diagnosis?

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