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Title: Relationship between fitness, birth weight and breastfeeding in adolescents of a rural village in Spain.

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Abstract: Objectives: Fitness in adolescence is closely related to health even in adulthood. Fitness can be improved with the practice of physical activity however other factors cannot be modified as in the case of birthweight or breastfeeding.
Equipment and methods: In this study we measured fitness of 233 students 14.76 (± 0.84) years through tests of the Eurofit battery such as 20 meter shuttle run test, horizontal jump, sit and reach, sit up 30 seconds, handgrip strength agility (4x10) and anthropometric data. Furthermore, we asked the birth weight and breastfeeding time.
Results: The results showed no significant differences in terms of breastfeeding, there were only differences in the boys in the sit up test (breastfeeding was related with better scores) and girls in flexibility (breastfeeding was related with lowers scores). Regarding the boys birth weight, a positive relationship was found between the anthropometric data and the dynamometry test; and the weight at birth. In girls, however, differences were found in several physical fitness tests with positive relationships in the aerobic endurance, hand grip strenght, sit up and horizontal jump tests. In conclusion birth weight was related with better fitness scores in girls. Additionally, for boys we found relationship with anthropometric variables. On the other hand, the time of breast milk intake did not seem to show a clear association with any of these variables.

Les rapports entre la forme physique, le poids de naissance et l'allaitement au sein chez des adolescents d'un village rural village d'Espagne.

Relationship between fitness, birth weight and breastfeeding in adolescents of a rural village in Spain.

Short title: Fitness, birth weight and breastfeeding in adolescents of a village in Spain.

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Science & Sports

Comments to the Author:

Reviewer: 1

We very much appreciate your constructive comments, useful information and your time. Thanks to this review, our manuscript has been substantially improved. Responses to your comments are written in bold.

Manuscript Number: SCISPO-D-18-00219 titled: "Relationship between fitness, birth weight and breastfeeding in adolescents of a rural village in Spain." Presents data collected over 233 students (118 males and 115 females),14.76 (± 0.84) years old of a rural institute. The authors evidence a relationship of fitness with birthweight but not breast feeding. This is not a fully new issue but it is interesting to investigate this is other populations.

The authors should provide explanatory hypotheses to understand why they don't find the same results as the previous investigators.

We thank the reviewer for the comments and suggestions. Information have been added in order to explain the results in page 9, paragraphs 43 and 44 and in the conclusions in paragraph 51.

On the average the paper is well written and the method is correct.

In Figure 1 authors should indicate the r value and the p value on the graphs.

We thank the reviewer for the comments and suggestions. Figure 1 has been improved with r and p values on the graphs.

Hoping that these minor issues can be resolved, receive a cordial greeting.

Les rapports entre la forme physique, le poids de naissance et l'allaitement au sein chez des adolescents d'un village rural village d'Espagne.

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SUMMARIES

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RÉSUMÉ

Objectifs : la forme physique durant l'adolescence est intimement liée à la santé, et ce même durant l'âge adulte. La forme physique peut être améliorée grâce à la pratique d'une activité physique. Cependant, d'autres facteurs ne peuvent pas être modifiés, comme c'est le cas pour le poids de naissance ou l'allaitement au sein.

Méthode: lors de cette étude, nous avons mesuré la forme physique de 233 collégiens de 14.76 (± 0.84) ans à travers des essais issus de la batterie de tests Eurofit : le test de course navette sur 20 mètres, le saut à l'horizontale, le sit and reach (flexions du tronc), les redressements sur 30 secondes, l'agilité et la force de poigne (4x10) ainsi que des données anthropométriques. D'autre part, nous avons demandé le poids de naissance et la durée de l'allaitement au sein.

Résultats: les résultats démontrent qu'il n'y a pas de différences significatives en ce qui concerne l'allaitement au sein, mais qu'il existe seulement des différences chez les garçons durant le test de sit up (l'allaitement au sein est lié à de meilleurs résultats) et chez les filles durant le test de souplesse (l'allaitement est lié à de moins bons résultats). En ce qui concerne le poids des garçons, un rapport positif a été démontré entre les données anthropométriques et le test de dynamométrie, et le poids de naissance. Cependant, chez les filles, nous avons pu trouver des différences parmi plusieurs tests de forme physique avec les rapports positifs dans les tests d'endurance aérobie, la force de poigne, le sit up et le saut à l'horizontale. En conclusion, nous pouvons établir un lien entre le poids de naissance et une meilleure forme physique chez les filles. De plus, chez les garçons, nous avons trouvé des rapports avec les variables anthropométriques. Par ailleurs, la durée de l'allaitement au sein ne démontre pas de lien clairement établi avec aucune de ces variables.

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MANUSCRIPT

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1. Introduction

2. Physical activity is defined as the movement of the skeletal muscles of the body and obtained as a result of an energy expenditure. If practiced regularly, it is considered one of the most effective methods to prevent the main causes of morbidity and mortality in Western countries. Moreover, it appears that from an early age, the degree of physical activity seems to be linked with certain cardiovascular risk factors [1].
3. It is also known that regular physical activity can maintain or improve certain aspects of fitness. Numerous investigations show that fitness, mainly aerobic capacity, as well as muscle strength, are important predictors of cardiovascular diseases [2].
4. At the end of the 20th century, the concept of fitness emerged closer to the field of health, reflecting as its main purpose the well-being of the individual over the traditional objective of sports performance [3]. As a consequence, the number of studies that related fitness and health was significantly increased [4-6]. Many of these studies confirmed that the level of fitness achieved in adult life, is conditioned by the level of fitness in childhood or adolescence. Likewise, cardiovascular diseases that appear in adulthood, have their origin in times such as adolescence or even childhood [1]. Therefore, the assessment of the level of fitness should be made from childhood, making a diagnosis as early as possible, to avoid cardiovascular disease associated with low level of fitness or obesity [7].
5. Children overweight and obesity is a huge problem in today's society, which is increasing considerably in many countries of the world. According to [8], obesity is an important risk factor for cardiovascular diseases, being linked to those defined as diseases of the metabolic syndrome (hypertension, dyslipidemia, insulin resistance, glucose intolerance). The AVENA study showed that between 20-30% of Spanish adolescents have an unfavorable blood lipid profile. The relationship between blood lipids and the development of coronary diseases in children and adolescents is established, with coronary heart disease being the main cause of global mortality [5].
6. There are evidences that relate birth weight and the relationship of breastfeeding time with fitness in adolescence or adulthood. For example, there are studies that have shown the relationship between postnatal nutrition with growth patterns and cardiovascular system [9-10], as well as the relationship between physical fitness level in adolescents and birth weight [2, 11].

7. In this context, the results of the AVENA study indicated that having low birth weight is a risk factor for cardiovascular disease, hypertension and type 2 diabetes [5]. Other studies have shown that cognitive development and school performance may be lower in children with low birth weight [11-12]. Furthermore, the level of fitness during their life may influence the cognitive development in children with low birth weight [13].

8. There is not as much literature that relates fitness and breastfeeding in children and adolescents as in the case of birth weight [14]. In some studies, better levels of fitness have been found in variables such as cardiorespiratory fitness, horizontal jump and flexibility in children exclusively breastfed in their first months of life [14-16], while others have not found such relationships in mixed breastfeeding, combining breastfeeding and artificial lactation [9, 17].
9. Ruíz et al. [5], also showed among its results that low birth weight is associated with the blood lipid profile, while others suggest that this association is too small to be considered important in public health. At the same time, the relationship between birth weight and the distribution of fat mass in the body in adulthood has been studied, although the associations were variable [12].
10. Some studies indicate that not only a good nutrition and practice of physical activity during the course of life is important, the lifestyle of the mother during the pregnancy, in relation to nutrition and exercise, can lead to the development of permanent adaptations in the physiology and metabolism of the fetus, with consequences later in life [2].
11. As previous research has shown, the birth weight, as well as the time of breastfeeding, affect the level of fitness in adolescents and at the same time with aspects related to obesity and overweight. Therefore, the purpose of the present study was to evaluate the relationship between the level fitness and anthropometric values of students in a secondary school with their birth weight and time of breastfeeding.

12. Materials and methods

13. Design and selection of the sample

14. 233 students (118 males and 115 females),14.76 (± 0.84) years old of a rural institute, in the town of La Rambla, (Cordoba, Spain) participated in the study.
15. The participants and parents or guardians were informed of the objectives and procedures of the research protocol, after that their informed consent was obtened.
16. Those students who were injured or who presented any type of illness that could condition the results of the investigation were excluded from the study, specifically six students with asthma, two with knee injuries and one with back injury. This study was carried out following the deontological norms of the Declaration of Helsinki (revision of Seoul, 2008), and was approved by the Bioethics Committee of the University of Jaen (Andalusia, Spain).

17. Measurements

18. Anthropometric measures and physical condition were assessed, furthermore information regarding the birth weight and lactation time of the participants was obtained.
19. Anthropometric characteristics
20. All measurements were made with barefoot subjects and light clothing, dedicating the first day solely to the anthropometric data collection. The weight in kilograms (kg) and the percentage of fat was measured with a Tanita BF 350 scale (precision 0.1 kg). A SECA stadiometer (precision 0.1 cm) was used for measuring the hight of the students. Based on these data, the body mass index (BMI = weight (kg) / height (m) 2) was calculated. The waist and hip circumference (centimeters) was measured with a non-elastic metric tape of 0.1 mm accuracy. Measurements of the perimeter of the waist and hip were made after the inspiration of the student and subsequent expiration of the air.

21. Birth weight and breastfeeding time

22. A shorter version of the questionnaire used in the HELENA study [18] was used. Through this questionnaire we collected data on birth weight and breastfeeding intake.
23. Birth weight was registered in kilograms, while breast milk intake time was coded as 0 (when the subject did not drink), 1 (if the intake was less than 3 months), 2 (if the intake was 3 to 5 months) and 3 (when the intake was 6 months or more).

24. Fitness tests

25. Before starting the measurements, a training session was held in order to guarantee the standardization, validation and reliability of the measurements. Five integrated tests were carried out within the EUROFIT battery [19] and we included the 4x10 round-trip test, which varies from the EUROFIT version, since it uses the 5x10 test. The scientific reason for the use of these tests in adolescents has been previously published [10] and used in the international studies AVENA and HELENA [5]. All students are trained in these tests and are regular used as a part of their assessment tools throughout their education.
    a) 20 meters shuttle run test. This is a maximal incremental field test that evaluates the maximum aerobic capacity indirectly. The subject performs a roundtrip race in 20 meters, the test begins with a smooth rhythm, the subjects should make the changes of direction at the moment of the sound signal that progressively accelerates. The test ends when the subject is not able to follow the rhythm that is imposed. The time in minutes and seconds was determined to increase the precision of the measurements. The author's original software in mp3 version [20] was used.
    b) Horizontal jump. It was used to assess lower body explosive muscular strength. The subject starts from a static position, located immediately after a line, with the feet separated shoulder widths and parallel, having to make a jump as far as possible without losing balance in the fall. Two attempts were made on a hard, non-slip surface, scoring the best of them. The result was recorded in centimeters, using a tape measure.
    c) Handgrip stenght. The manual grip strength in kilograms was assessed in both hands, using a TAKEY TKK 5110 dynamometer (interval 5-100 kg, precision 0.1 kg), with adjustable handle. The subject takes the dynamometer with the hand and keeping it slightly away from the body. The subjects must press gradually and continuously for 2 seconds. The optimal grip was calculated by the equation of Ruiz et al. [21]. Two attempts were made with each hand, scoring the best result. For the study we used the addition of the best result with each hand.
    d) 30 seconds sit up tests. It is a trunk power test in which the subject tries to execute as many sit-ups as possible, during a period of 30 seconds. The subject lies on his back on a mat, places his hands behind the back of his neck and his legs are flexed 90 degrees with his feet supported, then the subject must be incorporated until he touches the knees with his elbows. The number of correct executions of the movement will be noted. For its development we use a mat for each subject and a Casio HS-80TW chronometer.
    e) Agility test (4x10). Speed, agility and coordination are measured by this test. Two lines of 10 meters parallel are drawn and at each end we place two cones. The subject must perform four races from one extreme to another at maximum speed, picking up in the first case a sponge, which previously have been placed behind the lines, and exchanging it in the second and

third cases. The stopwatch stops when the subject crosses the last line. It will be recorded in hundredths of a second.

f) Sit-and-reach flexibility test. Through this test we measure the range of motion of the hip. With the subject sitting on a mat, legs extended and supporting the soles of the feet in a standardized box, the subject should bend the trunk forward, trying to reach as far as possible with outstretched hands, moving with the fingertips a rule located on the surface of the box, which has a graduation in centimeters.

26. To avoid alteration between tests, tests were performed on different days in the following order: day two (Sit-and-reach flexibility test and sit up tests), day three (20-m shuttle run), day four (agility test, 4x10) and day five (handgrip and horizontal jump).

27. Statistical Analyses

28. The data are presented as mean and standard deviation (SD). To differentiate the study variables related to body type (weight, height, body fat, BMI, waist circumference and hip perimeter) and physical condition (20-m shuttle run, horizontal jump, flexibility test, sit up, 4x10, and handgrip strenhgt) depending on the sex and the variable breast milk intake (yes vs. no), the Student's T-parametric test was used for independent samples, once the normality of the sample was confirmed. To differentiate the variables related to the body type and physical fitness of the participants according to the time taken for the mother's milk (none, <3 months, 3 to 5 months, ≥ 6 months), one-way ANOVA was used. To relate the variable weight at birth with the rest of the variables of body type and physical fitness, the Pearson bivariate correlation test was performed. In all the results a confidence level of 95% was used ($P \leq 0.05$). The data were analyzed using the statistical program SPSS, version 19.0 for Windows (SPS Inc, Chicago, USA).

29. Results

30. Table 1 shows anthropometric values and level of physical condition of the subjects classified by sex. The boys obtained significantly higher values in weight, height and waist circumference ($P < 0.000$), however the girls showed a greater percentage of body fat (16.40 ± 7.36 vs. 26.25 ± 7.53, $P < 0.000$). The results showed that in the girls there is a greater homogeneity in the group than in the boys, except for the percentage of fat.

31. In the values referring to physical condition test, significant differences were observed in each of the tests ($P < 0.000$), being in the boys clearly greater than in the girls, except for the flexibility test. it was observed in the anthropometric characteristics a greater homogeneity in the girl group, except for the flexibility and agility test, that there was a greater homogeneity in the boys.

32. Table 2 shows the results of anthropometric measurements and physical condition tests differentiated by sex and contribution (yes vs. no) of breast milk during the lactation period. In terms of percentages, 78.8% of the boys took breast milk compared to 21.2% who did not. In the girls, 80.87% took breast milk for 19.13% that they did not take.

33. Regarding breast milk, in boys, no significant differences were found, but greater results in the anthropometric values were observed in the boys who took breast milk with respect to those who did not. In the girls, there were no significant differences between those who took breast milk and those who did not, however it was observed

that the fat percentage approximates the existence of significant differences (P = 0.073). The girls who did not drink breast milk showed higher values in the anthropometric data, except for the height (159.84 ± 0.07 vs. 159.66 ± 0.007). In the tests of physical condition, significant differences were found in the abdominal test (P <0.019) for boys, with a mean of 24.88 and a standard deviation of 4.37 of those who took breast milk, while those who did not take presented an average of 22.44 and a standard deviation of 5.35. In the rest of the tests, the children who had breast milk presented better results, except for the long jump, although not in a significant way. Significant differences were found in the flexibility test in girls (P <0.027), with an average of those who took breast milk 17.14 and a standard deviation of 7.49, compared to a mean of 21.00 and a standard deviation of 6.10 per part of those who did not. On the other hand, in the rest of the tests, girls who did not drink breast milk showed higher values, with the exception of the agility and Course Navette tests. Although without significant differences in these tests.

34. Table 3 shows the results of the analysis of variance of the anthropometric characteristics and physical condition test with respect to the months of breastfeeding. There were significant differences in weight (P <0.046), however, no significant differences were found in the other variables (P> 0.05).

35. Table 4 shows a correlation between birth weight and anthropometric measurements and physical condition test, classified by sex. It was found, the boys presented significant differences between birth weight and all anthropometric measures, weight (P <0.003), fat (P <0.001), height (P <0.033), BMI (P <0.028), waist circumference (P <0.009) and hip perimeter (P <0.021). While girls only significant differences were observed in the percentage of fat (P <0.000). Regarding physical fitness tests, significant differences were found in the boys only in the manual dynamometry test (P <0.003). In contrast, in the girls the significant differences were obtained in the Course Navette (P <0.045), long jump (P <0.008), manual dynamometry (P <0.000) and abdominal (P <0.031) tests.

36. Figure 1 shows the graphic representation of the most significant correlation results between birth weight and study variables. Figure 1A and 1B show the results of correlation between birth weight and percentage of fat in boys (r = 0.295 and P = 0.001) and girls (r = 0.357 and P = 0.000) respectively. Figure 1C and 1D show the results of correlation between birth weight and manual dynamometry test in boys (r = 0.275 and P = 0.003) and girls (r = 0.335 and P = 0.001) respectively.

37. **Discussion**

38. The results obtained in our study showed that children who had breast milk had better results in the abdominal test. On the other hand, in girls, only significant differences were obtained in the flexibility test, being the girls who did not take breast milk those who presented the best results. In relation to the time of breast milk intake, a single significant association was obtained, those who took breast milk for 6 months or more are those who had higher weight values. Regarding the relationship between birth weight with the variables of body type and physical condition test, we found that children who weighed more at birth had higher values in each of the variables analyzed for body type, weight, percentage of fat, height, BMI and waist and hip circunference. Furthermore, girls who weighed the most at birth are the ones who presented higher levels of body fat. In the physical fitness tests, children who

weighed more at birth were those who obtained better results in the manual dynamometry test, in the same way, girls who weighed more at birth, showed higher results in the jumping, manual dynamometry and abdominals tests.

39. Differences by sex

40. As in our study different studies [2, 8, 12], showed significant differences the anthropometric characteristics such as weight, height, waist circumference and percentage of body fat, being the higher values in the boys, except in the percentage of fat.

41. In physical fitness levels, as in other studies [2, 13-14, 22-23] significant differences were shown between sexes being greater in boys with the exception of the flexibility test, which was higher in girls.

42. Breastfeeding

43. In relation to breastfeeding, O'Tierney et al. [24], showed that children who had breast milk for 2 to 8 months had a lower BMI and fat percentage than children who took less than 2 months or more than 8 months. In our study, conducted with other time categories of breast milk (lower limit, less than 3 months and upper limit, 6 months or more) we did not obtain significant associations between the variables of breastfeeding time with BMI and percentage of fat. However, there was a relationship between the children who took breast milk for 6 months or more with the weight values. Kramer et al. [25], found no associations between prolonged breast milk intake and height, BMI or body weight measurements, indicating similar results with the present study.

44. In the results of the present study, no a clear relationships were found between breast milk intake and physical condition tests. Similarly, Lawlor et al. [9] found no associations between breastfeeding with the level of physical condition. On the contrary, Labayen et al. [15], found associations between breastfeeding time with cardiorespiratory fitness, having a better aptitude those children who took breast milk for a longer time. Following the same line, in García et al [26], it was found that a longer breastfeeding time was associated with better long jump test scores in both boys and girls, while in the Course Navette test there were only significant differences in girls. Zaqout et al. [14] showed better results in boys and girls who were exclusively fed breast milk in the jumping and flexibility tests, which in the case of flexibility is contrary to our findings in girls. Nevertheless, this association disappeared after adjustment for Physical Activity and Body Mass Index. It seems that there is not a clear relationship between breast feeding and physical fitness because different studies present contradictory results. This may be due to fitness been influenced by genetic, biological, and lifestyle factors, Labayen et al. [15]. These factors may have influenced the results. For this reason, more research is need taking into consideration, genetic, biological, and lifestyle factors in order to provide a better conclusion.

45. Birth weight

46. Moura et al. [6], found positive relationship between birth weight and fat-free mass, being those heavier at birth who had greater fat-free mass. In Ortega et al. [10], it was shown that the boys with low birth weight had a higher profile of blood lipids, there being no such association in girls. In our study we found significance in the relationship of birth weight and percentage of fat, being those who had greater birth weight those who had a higher percentage of fat. The only body type measurement that showed significant results in both boys and girls was the percentage of fat in relation to birth weight.

47. Several studies have found a relationship between birth weight and a better aerobic capacity [11, 27]. In the present study, it was found that girls with higher birth weight had better results in the Course Navette test, there being no such association in boys, as did Ortega et al. [2] who also did not find differences in this test. Other studies agree on the non-existence of significant results in the long jump, flexibility and agility tests between low birth weight children and those who had normal weight [6] while others did find differences in tests like manual dynamometry in girls [2] jump, flexibility and speed [28]. In relation to our study, we are in line with these authors regarding the flexibility and agility tests in both boys and girls. However, in the long jump test, the girls presented significant differences, that is, those who weighed more at birth, obtained better results in the test.

48. Limitations

49. Several factors have to be recognized as possible limitations. In the first place, the size of the sample may influence the relationship of the study variables with the rest of the measurements. Furthermore, the time elapsed since the measurement of the variables birth weight and breast milk intake could present a limitation, affecting the association between these variables with anthropometric measurements and physical condition test.

50. Conclusions

51. The results showed that birth weight can have an impact on the physical condition of girls and on the anthropometric variables of boys. However, the time of breast milk intake does not seem to show a clear relationship between these variables, only in the abdominal test for boys and the flexibility test for girls. More research is needed taking into consideration other variables, such as, genetics, biological, and lifestyle factors in order to provide a more explicit conclusion.

52. ***Disclosure of interest.***

53. The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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TABLES

Table 1.— *Characteristics of the subjects according to sex.*

Variable	Boys (n=118)	Girls (n=115)	P
	Mean ± SD	**Mean ± SD**	
Age (years)	14.74 ± 0.84	14.77 ± 0.84	0.841
Weight (kg)	65.36 ± 15.49	55.72 ± 10.88	**0.000**
Fat (%)	16.40 ± 7.36	26.25 ± 7.53	**0.000**
Heigth (cm)	169.70 ± 0.09	159.80 ± 0.07	**0.000**
BMI (kg/m^2)	22.49 ± 4.02	21.78 ± 3.86	0.173
Waist circunference (cm)	82.42 ± 11.11	77.22 ± 9.50	**0.000**
Hip circunference (cm)	95.49 ± 10.06	94.80 ± 8.37	0.568
Shuttle run (min)	7.18 ± 2.19	4.16 ± 1.18	**0.000**
Long jump (cm)	180.39 ± 25.45	142.91 ± 20.29	**0.000**
Flexibility (cm)	13.14 ± 7.08	17.88 ± 7.38	**0.000**
Handgrip (kg)	63.189 ± 16.40	43.21 ± 8.35	**0.000**
Abs (n)	24.36 ± 4.65	19.03 ± 4.02	**0.000**
Agility (s)	11.35 ± 0.98	12.86± 1.15	**0.000**
Birth weight (kg)	3.39± 0.53	3.29 ± 0.51	0.144

BMI, body mass index. Handgrip strength sum of the two hands. SD, standard deviation.

Table 2.— *Relationship of anthropometric measurements and physical condition test depending on breastfeeding.*

Variables	Boys			Girls		
	Breastfeeding (n=93)	**No breastfeeding (n=25)**	**P**	**Breastfeeding (n=93)**	**No breastfeeding (n=22)**	**P**
	Mean ± SD	**Mean ± SD**		**Mean ± SD**	**Mean ± SD**	
Weight (kg)	65.92 ± 15.77	63.26 ± 14.53	0.429	55.62 ± 11.26	56.17 ± 9.30	0.812
Fat (%)	16.80 ± 7.64	14.91 ± 6.11	0.199	25.72 ± 7.79	28.48 ± 5.97	0.075
Heigth (cm)	170.12 ± 0.10	168.16 ± 0.08	0.305	159.84 ± 0.07	159.66 ± 0.07	0.919
BMI (kg/m^2)	22.57 ± 4.08	22.18 ± 4.02	0.657	21.72 ± 3.97	22.04 ± 3.41	0.709
W. Cin. (cm)	82.45± 11.04	82.33 ± 11.57	0.964	76.70 ± 9.86	79.43 ± 7.60	0.163
H. Cin. (cm)	95.93 ± 10.30	93.87 ± 9.09	0.335	94.65 ± 8.69	95.43± 6.95	0.655
Shuttle run(min)	7.20 ± 2.25	7.09 ± 1.58	0.699	4.17 ± 1.15	4.13 ± 1.29	0.849
Long jump (cm)	180.32 ± 26.12	180.64 ± 23.30	0.953	141.44 ± 19.10	149.14 ± 24.21	0.175
Flexibility (cm)	13.32 ± 7.16	12.48 ± 6.90	0.594	17.14 ± 7.49	21.00 ± 6.10	**0.027**
Handgrip (kg)	63.65 ± 16.79	61.49 ± 15.06	0.539	42.90 ± 8.23	44.56 ± 8.92	0.433
Abs (n)	24.88 ± 4.37	22.44 ± 5.35	**0.019**	19.01 ± 4.13	19.14 ± 3.62	0.888
Agility (s)	11.39 ± 1.04	11.19 ± 0.72	0.251	12.92 ± 1.15	12.60 ± 1.15	0.256

BMI, body mass index; W. cin., Waist circunference; H. Cin., Hip circumference; Handgrip strength sum of the two hands; SD, standard deviation.

Table 3— *Relationship of anthropometric measurements and physical condition test according to the time of breastfeeding.*

	Ninguno (n=47)	**<3 meses (n=43)**	**3-5 meses (n=59)**	**>6 meses (n=84)**	**P**
Weight (kg)	59.94 ± 12.75	55.86 ± 11.70	60.89 ± 14.18	63.33 ± 15.70	**0.046**
Fat (%)	21.26 ± 9.09	19.10 ± 8.50	22.38 ± 9.28	21.59 ± 8.74	0.316
Height (cm)	164.18 ± 0.09	163.08 ± 0.09	164.52 ± 0.10	166.27 ± 0.10	0.302
BMI (kg/m^2)	22.11 ± 3.63	20.87 ± 3.27	22.29 ± 4.06	22.71 ± 4.27	0.100
W. Cin. (cm)	80.97 ± 9.92	76.37± 8.74	79.50 ± 10.01	81.27 ± 12.03	0.083
H. Cin.	94.60 ± 8.11	95.09 ± 7.43	95.46 ± 10.36	96.81 ± 9.58	0.053
Shuttle run (min)	5.47 ± 2.18	5.57 ± 2.33	5.37 ± 2.23	5.52 ± 2.30	0.898
Long jump (cm)	165.89 ± 28.34	161.26 ± 32.53	162.00 ± 30.08	159.90 ± 28.95	0.743
Flexibility (cm)	16.47 ± 7.77	16.49 ± 7.17	15.12 ± 7.55	14.67 ± 7.76	0.451
Handgrip (kg)	53.57 ± 15.09	53.32 ± 18.79	51.87 ± 15.76	54.24 ± 16.56	0.868
Abs (n)	20.89 ± 4.86	21.88 ± 5.19	21.42 ± 5.44	22.35 ± 4.93	0.435
Agility (s)	11.85 ± 1.18	12.11 ± 1.14	12.21 ± 1.52	12.14 ± 1.30	0.530

BMI, body mass index; W. cin., Waist circunference; H. Cin., Hip circumference; Handgrip strength sum of the two hands; SD, standard deviation.

Table 4.— *Bivariate linear correlations between birth weight and anthropometric variables and physical condition.*

Variables	Birth weight			
	Boys (n=118)		Girls (n=115)	
	r	P	r	P
Weight (kg)	0.272	**0.003**	0.144	0.125
Fat (%)	0.295	**0.001**	0.357	**0.000**
Height (cm)	0.196	**0.033**	-0.012	0.897
BMI (kg/m^2)	0.203	**0.028**	0.086	0.359
W. Cin. (cm)	0.239	**0.009**	0.127	0.176
H. Cin.	0.212	**0.021**	0.070	0.456
Shuttle run (min)	0.060	0.520	0.187	**0.045**
Long jump (cm)	0.076	0.416	0.247	**0.008**
Flexibility (cm)	-0.037	0.693	0.067	0.474
Handgrip (kg)	0.275	**0.003**	0.335	**0.000**
Abs (n)	0.089	0.340	0.202	**0.031**
Agility (s)	0.014	0.883	-0.118	0.207

BMI, body mass index; W. cin., Waist circunference; H. Cin., Hip circumference; Handgrip strength sum of the two hands; SD, standard deviation; r, Pearson correlation.

TITLES OF FIGURES

Figure 1.— *Linear correlation between birth weight and percentage of fat and manual dynamometry test.*