

## RELATIVE AGE EFFECT IN BRAZILIAN HANDBALL SELECTIONS

## EFEITO RELATIVO DA IDADE NAS SELEÇÕES BRASILEIRAS DE HANDEBOL

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## ABSTRACT

The aim of this study was to evaluate the relative age effect (RAE) in Brazilian male handball teams who competed in the world championships in the U-19, U-21, and adult categories. The sample was composed by 160 male handball players, 47 players being on U-19 category, 48 on U-21, and 65 on Adult category. The chronological age, body mass, height, and game position of each athlete were obtained on the International Federation of Handball website. The adopted significance level was of 5%. RAE was observed in all the three following categories U-19 ( $X^2=21.511$ ,  $P<0.01$ ), U-21 ( $X^2=15.894$ ,  $P=0.01$ ) and Adults ( $X^2=35.123$ ,  $P<0.01$ ). Moreover, no RAE was found in re-selection process by sequential category ( $P= 0.63$ , U-19 to U-21;  $P= 0.46$ , U-21 to Adult). The RAE is found in Brazilian male handball national teams. However, this effect was not found in re-selection process, thus, players have great influence of RAE in U-19 and this remains through subsequent categories.

**Keywords:** Athletes. Growth. Relative age effect. Handball.

## RESUMO

O objetivo do presente estudo foi avaliar o efeito relativo da idade (ERI) nas seleções Brasileira de handebol que competiram nos campeonatos mundiais das categorias Sub-19, Sub-21 e Adulta. A amostra foi composta por 160 jogadores de handebol do sexo masculino, sendo 47 pertencentes a categoria Sub-19, 48 a Sub-21 e 65 a Adulta. A idade cronológica, massa corporal, estatura e posição de jogo de cada atleta foram obtidas no site oficial da Federação Internacional de Handebol. O nível de significância adotado foi de 5%. ERI foi observado em todas as três seguintes categorias Sub-19 ( $X^2=21.511$ ,  $P<0.01$ ), Sub-21 ( $X^2=15.894$ ,  $P=0.01$ ) e adulta ( $X^2=35.123$ ,  $P<0.01$ ). Além disso, não foi encontrado ERI no processo de re-seleção pela categoria sequencial ( $P= 0.63$ , Sub-19 para Sub-21;  $P=0.46$ , Sub-21 para Adulta). O ERI foi encontrado nas seleções brasileiras de handebol. Contudo, este efeito não foi encontrado no processo de re-seleção, assim, os jogadores sofrem grande influência do ERI na categoria Sub-19 e isto permanece durante as categorias subsequentes até a equipe adulta.

**Palavras-chave:** Atletas. Crescimento. Efeito relativo da idade. Handebol.

## Introduction

The selection of athletes in so-called elite sports has been occurring in younger age groups each time; this process begins especially during adolescence. This is the period when the maturity status seems to be a determinant influencer to achieve good physical performance in team sports<sup>1</sup> and greater variables of body size<sup>1-4</sup>. In this sense, athletes with advanced maturational process have greater chances to be part of clubs and federations' selection.

Especially for juvenile athletes, there is concern related to the relative age effect (RAE) during selection and practicing processes. RAE refers to physical, anthropometrical, and psychological advantages in favor of those born at the beginning of the year, compared with those born in the final months of the year, within the same age group<sup>5</sup>.

The grouping of these age groups, especially in team sports, is performed by a biannual period of the year of birth of the athlete, and this may present advantages for some athletes, especially those born in the first semester of the first year of the category, and disadvantages for others<sup>1</sup>.

Several sports point out the reversal of RAE in the senior teams, with no advantage of the older athletes being observed in the main teams, such as baseball, basketball, rugby, and, mainly, soccer<sup>6-8</sup>. This effect is also observed in handball<sup>9,10</sup>, predominantly in countries which the sport is well spread and have a consolidated national championship since several decades ago. In contrast, Brazilian handball had been seeking its place in the international environment of selection, and only in 1997 it had its first national championship organized<sup>11</sup>.

Hancock et al.<sup>12</sup> highlights that RAE is a social construction and it can be observed in different domains. However, in countries where high level of handball performance does not have a social and media appeal like soccer, the reverse effect might occur. Therefore, the understanding of RAE in Brazilian handball is necessary, since the sport is composed by many factors as physical demands, specific anthropometric<sup>13</sup>, specific game positions, and cultural influence which are required in international competitions<sup>4</sup>.

In this case, coaches have a tendency to selected taller, stronger, and more skillful players in youth categories. Normally, athletes born in the first semester of the year present better development in these abilities<sup>14</sup> and this tendency may exclude future young sports talents who do not fit this profile, since the selection of players still in childhood is not a precondition for success in the sport at national adult level<sup>15,16</sup>.

Nevertheless, given the absence of studies which investigated the RAE in Brazilian handball selection, the aim of this study was to evaluate the RAE in Brazilian male handball teams which competed in the 2011, 2013, 2015 and 2017 world championships in under-19 (U-19), under-21 (U-21), and adult categories.

## Methods

### *Participants*

The sample was composed by 160 Brazilians handball athletes, male, that represented the U-19 selection (n=47; age = 18.63 ± 0.81yrs; body mass = 87.58 ± 10.60kg; stature = 187.9 ± 6.68cm), U-21 (n=48; age = 20.61 ± 0.79yrs; body mass = 92.68 ± 12.76kg; stature = 189.68 ± 6.60cm) and adult (n=65; age = 26.29 ± 3.96yrs; body mass = 94.83 ± 8.86kg; stature = 190.83 ± 5.33cm) in the world championships in 2011, 2013, 2015 and 2017, but in the 2017 world championship it was not collected information related to U-19 and U-21 players, since it was not found.

### *Procedures*

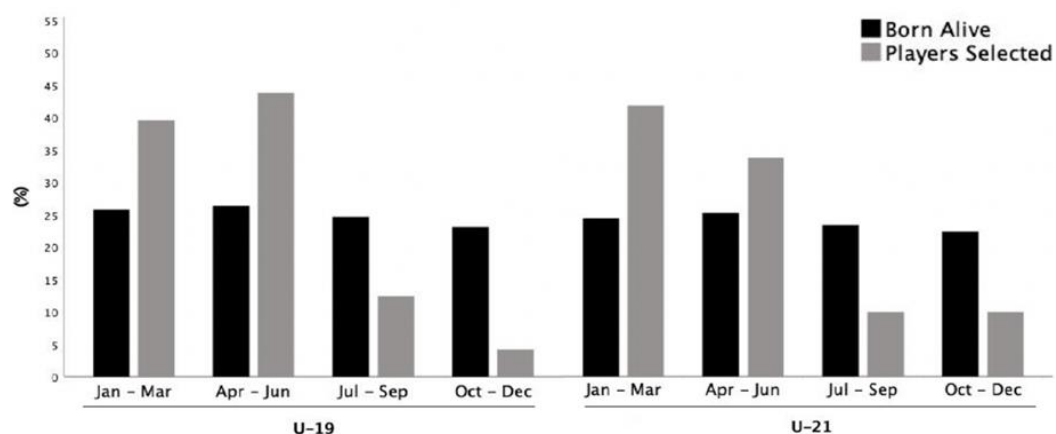
Data was obtained through a public database that is available on the website of the International Handball Federation<sup>17</sup>, in which information was collected about game categories, date of birth, body mass (kg), height (cm) and game position. The athletes were classified in quartiles by their month of birth (Q1 to Q4). In Q1, players were born from January 1st to March 31st; in Q2, from the April 1st to June 31st; in Q3, from July 1st to September 31st; and in Q4, from October 1st to December 31st. The distribution of the birth month of the athletes was compared to the distribution of births in Brazil during the same period between 1992 and 1999 (Figure1)<sup>18</sup>.

### *Statistical analysis*

The association of the RAE between born quartiles of each category was obtained through Chi-square test of adhesion taking into consideration the births of each year. Regarding the association between game categories and category promotion, Chi-square test was applied with the likelihood correction of ( $P < 0.05$ ).

## Results

The frequency of subjects who were born in Brazil during the years of the data collected (1992 to 1999) and the born quartile are presented in Figure 1. It showed high frequency of population who had been born in the first and second quartile.



**Figure 1.** Distribution of the players of the Brazilian U-19 and U-21 teams according to the birth quartiles

Source: Authors

Table 1 showed measurements of association among categories and born quartiles. Results confirmed a RAE, with a prevalence of players who were born in the first and second quartiles, measurements of Adherence Chi-square Test was significantly for groups U-19 ( $X^2=21.511$ ,  $P < 0.01$ ), U-21 ( $X^2=15.894$ ,  $P = 0.01$ ) and Adults ( $X^2=35.123$ ,  $P < 0.01$ ). However, there is no association between categories and born quartiles ( $X^2= 9.559$ ,  $P = 0.14$ ).

**Table 1.** Chi-square of adherence and independent in relation to categories and quartile of birth

Category (n)	Quartiles (%)				$X^2$	
	1°	2°	3°	4°	Adhesion	Likelihood ratio
U-19 (n=47)	39.60	43.80	12.40	4.20	<0.01	0.17
U-21 (n=48)	43.80	35.40	10.40	10.40	0.01	
Adult (n=65)	55.40	23.10	7.70	13.80	<0.01	

**Note:** All values were expressed frequently according to the respective category. The Chi-square test of adherence was performed taking into account that every month should present the same distribution. Significant association values were considered for  $p < 0.05$

Source: Authors

The promotion of youth athletes to U-21 or Adults are presented in Table 2. The association of born quartile and promotion did not report significance, and the numbers of subjects that were in group U-19 being promoted to U-21, were  $X^2=1.737$  ( $P = 0.63$ ), and U-21 to Adults were  $X^2=2.566$  ( $P = 0.46$ ).

**Table 2.** Association between quartiles of birth and promotion for adult category in categories U-19 and U-21

Category (n)	Quartiles				X <sup>2</sup> Likelihood ratio
	1°	2°	3°	4°	
<b>U-19 (n=47)</b>					
<b>U-21 re-selected (18)</b>	8	8	1	1	0.63
<b>Not re-selected (29)</b>	10	13	5	2	
<b>U-21 (n=47)</b>					
<b>Adult re-selected (9)</b>	5	3	0	1	0.46
<b>Not re-selected (38)</b>	15	14	5	4	

**Note:** The values were presented in their absolute value. For the analysis of the association, the chi-square test with likelihood correction, considered significant values of  $p < 0.05$

**Source:** Authors

## Discussion

The main finding of this study was the existence of the RAE on the ages of the U-19, U-21 and adult teams of the Brazilian handball team in the last world championship. The effect was not observed in the re-selection of these athletes from the U-19 category to the U-21 and from the U-21 category to the adult, even with the first months of the year presenting a higher frequency of re-selected athletes, since this re-selection maintained proportional measurements regarding the number of athletes within each month in the previous categories.

In invasion team sports, such as hockey, baseball, basketball, rugby and soccer, there is a tendency of the influence of the month of birth on the selection of young athletes<sup>2,4,6,7</sup>. In high-performance sports, physical and maturational advantages originated from RAE may lead coaches to select the larger and higher physical performance<sup>19</sup>, taking those selected to have greater access to resources such as practices and high quality training for specific skills of the sport, as well as increased time to play<sup>20</sup>.

Specifically in handball, this effect was also observed in Danish athletes<sup>9</sup> and Norwegian<sup>10</sup>, these are countries where this sport is widespread. However, unlike the results of this study, they found in the adult category the reverse effect of the relative effect of age<sup>9,10</sup>, with difference of birth in the first months decreasing or equalling to those who were born in the last months of the year.

One of the explanations for the occurrence of RAE in them adult Brazilian team might be associated with the social and cultural significance of sport. In this case, the commercial and television appeal has influenced the opportunities for players<sup>12</sup>. Brazilian handball has little media appeal compared to other sports in Brazil, thus giving less opportunities or sponsorship for clubs and new players. Another aspect may be associated with the organization of sport in Brazil, since Brazilian confederation of handball may be considered very young, close to 40 years old and with its first national championship in 1997, therefore Brazil has few national teams, and this fact propose less chances for athletes that were less developed in basis categories<sup>11</sup>.

Regarding re-selection of these athletes in the adult category, this was not associated with months of birth in the U-21 ( $X^2=0.63$ ) or adult categories ( $X^2=0.46$ ), demonstrating that regardless of the month of birth the chance of re-selection in Brazilian athletes is the same for those born in the initial months as for those born in the final months of the year. Information obtained in other sports, like rugby, hockey, soccer and handball<sup>2,6-9</sup> showed that younger players in the juvenile categories, between the transition from the juvenile and the adult

category, reappear among the re-selected, indicating that younger players in the juvenile categories are able to reappear in the re-selected athletes in the adult team.

These data indicate that RAE in Brazil remains in the adult category. This may occur because the Brazilian league is still in development, thus counting on a reduced number of professional teams when compared to other national leagues, mainly European, which have a greater number of players and teams<sup>4</sup>. This contributes to talent development since the young athletes remain in the training process, not only those who present a certain physical advantage in the initial categories, which can be provided by RAE and biological maturation<sup>9,14</sup>, unlike other leagues in which the athletes born in the months at the end of the year reappear in elite teams<sup>4,9,21</sup>.

The information obtained in this study may assist mainly Brazilian coaches on the influence of RAE in Brazilian handball athletes, as in developed countries this effect ceases to exist. Also, a new look is needed at the training of young handball athletes, especially regarding the aspect of exclusion of the athletes born in the final months of the year. It is necessary that professionals who participate in the selection and training of young handball athletes recognize the influence of the RAE during the process of formation of young athletes. This is one of the first studies to observe the RAE and category promotion in the different categories of the Brazilian Handball Selection. Despite the fact that the study evaluated the categories at different times and with different coaches, these can present different selection philosophies, impacting on the selection and identification of talented athletes.

## Conclusion

The study presented the RAE in Brazilian handball players, with most players selected in the first semester, especially in the first quartile (January to March). And, this effect does not disappear in the Adult category. However, this effect was not reported in the re-selected of the basis categories where the born quartiles did not influence on the players' re-selection. In conclusion, players have most influence of RAE in the U-19, and then remain over the subsequent categories, however, the month of birth does not influence re-selection in adulthood, the professionals involved in the training and selection of athletes should have a special look especially in relation to the exclusion aspect of athletes born in the last months of the year.

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