

Planning and execution of handball goalkeepers training: a descriptive study in youth categories teams in Brazil

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Abstract - Aim: This study aimed to describe how specific training for goalkeepers of youth handball teams is planned and executed in Brazil. **Methods:** This cross-sectional descriptive and quantitative study was based on information from 134 coaches responsible for specific training of handball goalkeepers for youth (under 12 - U12; U14; U16; and U18) teams. The selection of participants was non-randomly for convenience, using the virtual snowball method. The information was obtained through an online self-completion questionnaire carried out by the Google Forms platform. The questionnaire data were tabulated and assessed using the SPSS statistical program, and the information was presented using descriptive statistics. **Results:** The results show that specific training of goalkeepers occurs in 71.1% of youth handball teams. About the structure of the specific training session, most of it is performed 1 or 2 times a week (70.9%), lasting from 25 to 60 min (73.9%) and given by the team's leading coaches (77.6%). More than half of the participants stated that the training session occurs with the goalkeepers and the person in charge (55.2%). Most participants (69.4%) stated that the teams analyze and assess the goalkeepers' performance, and the training planning takes place weekly (39.6%). **Conclusion:** This data provides essential information that partially fills gaps in the literature and allows researchers and coaches to reflect on their practices, considering the importance of planning specific training for goalkeepers.

Keywords: team sport, coaches, kids, sports training and youth sports.

Introduction

In handball, athletes perform different defensive or offensive actions and functions during a match, thus requiring several specific positions¹. The goalkeeper plays inside the area and can be considered the last defender (e.g., when avoiding the opposing team's goal) and a first attacker (e.g., recovering the ball possession to start a fast break)^{2,3}.

In this regard, the goalkeeper has specific needs involving physical, psychological, tactical, technical and perceptive aspects that differ from the court players⁴, which requires specific training⁵. Thus, information about the preparation, organization, monitoring, and assessment of the specific training of goalkeepers of the youth category of handball must be made available, contributing to successful models of goalkeeper training⁶.

Although there are studies on specific training for handball goalkeepers, most were carried out with high-level athletes from the male adult category on aspects

related to game analysis^{7,8}. Thus, there is a scarcity of information on the subject involving athletes from the youth categories⁷, and there aren't studies that show how goalkeepers' specific training is conducted in different youth handball teams in Brazil.

Such a scenario makes it difficult and can compromise the long-term development of goalkeepers in handball. In this regard, knowing how specific training for goalkeepers is carried out in youth teams becomes relevant. Given the above, the present study aimed to describe how specific training for goalkeepers of youth handball teams is planned and executed in Brazil.

Methods

Design and participants

This cross-sectional descriptive and quantitative study was performed using information from 134 coaches who are responsible for specific training of handball goal-

keepers for youth teams in Brazil. The selection of participants took place non-randomly for convenience and in stages. Initially, it was considered an eligibility criterion to coach handball in youth categories in Brazil. This selection stage was considered to identify teams in which specific training for goalkeepers was carried out. From this identification, coaches answered the questions regarding the structure of the training for goalkeepers. Minors and those who only provided specific training in the junior or adult categories were excluded. We adopted as youth categories⁹: U12, U14, U16, and U18. In general, the experiment involved 134 participants.

The present study was approved by the Internal Review Board of the University, under protocol number 4.436.955. All participants consented to participate in the study by accepting the Free and Informed Consent Form (TCLE) at the beginning of the questionnaire.

Recruitment

The recruitment of participants was carried out using the virtual snowball method¹⁰, with the sample built through a network of contacts expansion. This network had as its starting point 2 groups that communicate regularly using an instant messaging application, voice, and video calls, and sending files to smartphones (WhatsApp); and fifty-two e-mail contacts from all handball state federations (some had more than one e-mail address) in Brazil, which were made available by the Brazilian Handball Confederation (CBHb). One of the WhatsApp groups had approximately 200 members from different regions of Brazil. The other WhatsApp group had 100 participants from Rio Grande do Sul (a Southern Brazilian State).

To start the data collection, a brief explanation about the study was sent to the groups, along with an invitation to participate with the link to access the Free and Informed

Consent Form (TCLE) and the questionnaire, available on Google Forms platform. In the groups, this sending was carried out five times on different days and times (with a difference of 7, 6, 3, and 4 days between them, respectively). In addition, e-mails were sent to federations three times, excluding those that had already responded. For federations that did not return on the second attempt, we looked for profiles on social networks (Facebook and/or Instagram) to contact to expand the scope of the study to all states.

In addition, several professionals helped, both in disseminating the questionnaire to other WhatsApp groups and providing the phone number of colleagues in their states for us to contact. For these nominees, in addition to the message of invitation to participate, the professional who had indicated them was also mentioned to make contact more personal. In addition, respondents who were not involved with the specific training in their team could indicate the person responsible directly in the questionnaire so that we could contact them later.

The questionnaire was open for four weeks (from February 22 to March 21, 2021), and the recruitment phases took place during this period. After all the stages to select the participants, 299 questionnaires were answered. From these, 134 met the eligibility criteria (Figure 1) and were used to analyze the structuring of the specific training for handball goalkeepers of youth teams in Brazil.

Instrument

The information was obtained through an online self-completion questionnaire, carried out by the Google Forms platform, with open and closed questions structured to answer the research objectives. The instrument's preparation was carried out considering the study by Salles et al.¹¹, with adjustments made to attend to the objectives

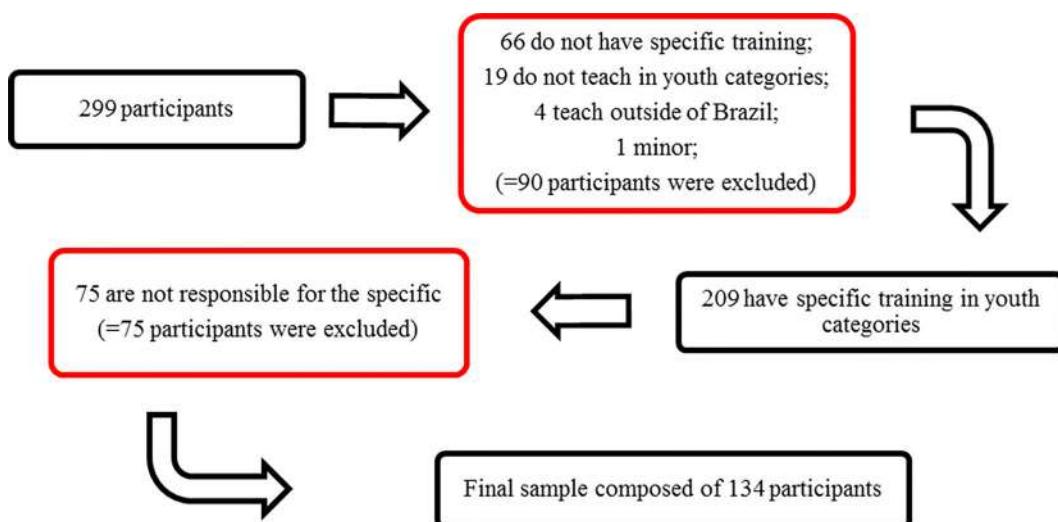


Figure 1 - Flowchart of the exclusion steps.

of this study. The questionnaire was divided into 12 sections, and participants were referred to these sections according to their involvement with the specific training of handball goalkeepers.

The questions addressed aspects of the demographic profile of the participants (gender and date of birth), academic background (undergraduate, hold a degree and which area and year of completion), professional profile (time working with youth categories, role in the team, state they work in, place where they work and remuneration) and their involvement in specific training.

The professionals who were responsible for the specific training for goalkeepers, or part of it, were referred to the section composed of questions about the structure of the specific training, namely: weekly frequency, duration of the session, how the training takes place, frequency of planning, what content in each category the professionals provide and whether the team analyzes and/or assess the goalkeepers' performance.

Regarding the contents taught, categories were created according to the study by Moreno et al.⁸. Four possibilities of specific training models were indicated: a) the "physical-technical" aimed at preparation through conditional and coordinating factors; b) the "perceptive" focused on improving the mechanisms of perception and visual skills; c) the "tactical" aimed at decision making; d) "others", but in the study by Moreno et al.⁸ no studies were found that addressed this content. In our collection instrument, explanations about each content right after the question and before the possibilities of answers. In order to contemplate the "others" content, an open question was created for professionals to describe which contents work in addition to the 3 proposed ones that were present in a closed question.

It is important to note that a pilot study was carried out to identify the clarity and reproducibility of the questionnaire. The definition of clarity was carried out from the analysis of 15 individuals from different professional profiles who answered and analyzed the questions, namely: 5 handball coaches linked to clubs and/or schools, 3 specific coaches of experienced handball goalkeepers, 1 professional not linked to Physical Education, 1 futsal coach, 4 undergraduate students in Physical Education and 1 academic master's degree in Physical Education. From the point of view of these different characters, the final version of the instrument was prepared, having the questions structured, clear and concise to meet the survey objectives better.

In order to test the reproducibility and agreement of the questionnaire, data collection was carried out with 10 coaches of futsal teams involved in the specific training of goalkeepers. The professionals answered the questionnaire at two different times, with a minimum of 7 and a maximum of 10 days apart. The choice of futsal professionals was made for convenience and due to the factors investigated being similar to those of handball, as an invasion

team sport with the goalkeeper. These data were analyzed using the Kappa coefficient for the categorical variables and showed high agreement (substantial and perfect) with the Kappa coefficients ranging from $k = 0.78$ to $k = 1.0$.

Data analysis

Data from the questionnaire were tabulated and analyzed using the SPSS 20.0 statistical program, and the information was presented using descriptive statistics. For the information in which the responses were organized in the format of categorical variables, absolute and relative frequencies were used. For the answers organized in the format of numerical variables, the mean and standard deviation were used.

Results

Figure 2 shows the frequencies of participants according to the states and macro-regions of the country. It is important to note that only in the Sergipe state has no participant reported that specific training was realized in their teams, thus contemplating 25 states and the Federal District with respondents who carried out specific training of handball goalkeepers.

As for the profile of the participants, most respondents are male, aged between 30 and 39 years, with 82.1% holding a degree in Physical Education or Sports, with 6 to 15 years since they finished their course (47.3%), and more than half (56.7%) have a post-degree (see Table 1).

Concerning professional performance, more than half of the participants work as head coaches on their teams, and most of them work in school teams. Regarding remuneration, about a third of professionals have worked

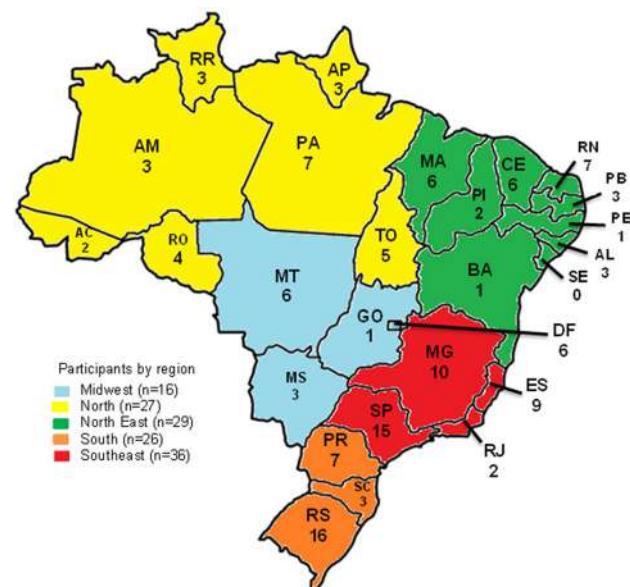


Figure 2 - Map of the distribution of participants by states and regions in Brazil (n=134).

Table 1 - Characterization of the profile of professionals who perform specific training in the youth categories (n = 134).

| Gender (n; %) | | | Time of performance in youth categories in years [^] (\bar{x} ; $\pm dp$) | | | |
|---|-------|------------|--|------|------------|--|
| Female | 22 | 16.4% | | 13.2 | ± 9.53 | |
| Male | 112 | 83.6% | | | | |
| Age (\bar{x} ; $\pm dp$) | 39.71 | ± 9.97 | | | | |
| Age Groups (n; %) | | | Length of experience in basic categories in years (n; %) | | | |
| 20 to 29 years | 22 | 16.4% | Up to 5 years | 35 | 26.1% | |
| 30 to 39 years | 52 | 38.8% | From 6 to 10 years | 29 | 21.6% | |
| 40 to 49 years | 34 | 25.4% | From 11 years to 15 years | 27 | 20.1% | |
| 50 to 68 years | 26 | 19.4% | From 16 to 20 years old | 16 | 11.9% | |
| | | | From 21 to 29 years old | 14 | 10.4% | |
| | | | From 30 to 40 years old | 11 | 8.2% | |
| | | | They did not answer | 2 | 1.5% | |
| Education (n; %) | | | Locations [*] (n; %) | | | |
| No degree | 8 | 6.0% | School | 70 | 52.2% | |
| Hold a degree in Physical Education or Sport | 110 | 82.1% | Club | 46 | 34.3% | |
| Hold a degree in Psychology | 1 | 0.7% | City Hall | 29 | 21.6% | |
| Hold a degree outside the area or without specifying | 5 | 3.7% | State Federation | 20 | 14.9% | |
| Undergraduate in Physical Education or Sport | 5 | 3.7% | University | 7 | 5.2% | |
| Undergraduate in other areas or without specifying | 5 | 3.7% | Brazilian Handball Confederation (CBHb) | 7 | 5.2% | |
| Time since holding a degree in Physical Education or Sport in years [#] (\bar{x} ; $\pm dp$) | 15.04 | ± 9.21 | Others | 6 | 4.5% | |
| Time since holding a degree in Physical Education or Sport (n; %) | | | Activity remuneration (n; %) | | | |
| Up to 5 years | 11 | 10.0% | The main source of income | 42 | 31.3% | |
| From 6 to 10 years | 24 | 21.8% | They are remunerated, but not the main source of income | 50 | 37.3% | |
| From 11 years to 15 years | 28 | 25.5% | They do not receive remuneration | 38 | 28.4% | |
| From 16 to 20 years | 14 | 12.7% | Other | 4 | 3.0% | |
| From 21 to 29 years | 13 | 11.8% | Function performed (n; %) | | | |
| From 30 to 37 years | 11 | 10.0% | Team Coach | 104 | 77.6% | |
| They did not answer | 9 | 8.2% | Coach's technical assistant | 4 | 3.0% | |
| Post degree (n; %) | | | Goalkeeper coach | 17 | 12.7% | |
| No | 58 | 43.3% | Psychologist | 1 | 0.7% | |
| Hold a specialist degree | 68 | 50.7% | More than one function | 6 | 4.5% | |
| Hold a master's degree | 6 | 4.5% | Others | 2 | 1.5% | |
| Hold a doctoral's degree | 2 | 1.5% | Legend: *Question in which participants could indicate more than one answer; #average for 101 participants, as 9 did not answer; ^average for 132 participants, as 2 did not answer. | | | |

with handball as their primary source of income (see [Table 1](#)).

Regarding how the specific training sessions occur, most participants stated that it occurs with the goalkeepers and the person in charge. Only about a fifth of the participants reported that goalkeeper training is done simultaneously with genders and different categories (see [Figure 3](#)).

Regarding the specific training structure, most participants report that it occurs once or twice a week (70.9%), and most of the duration is from 25 to 60 min (73.9%). As

for the periodicity of planning, more than a third do so weekly. In addition, more than two-thirds of professionals perform analysis and assessment of goalkeepers' performance (see [Table 2](#)).

The content covered during the training of handball goalkeepers in the youth teams revealed a high use of physical-technical content, increasing throughout the categories, being below 60% only in the U12 team and above 80% in the other categories (see [Figure 4](#)).

The tactical content is similar behavior to the physical-technical one, but in smaller percentages, starting with



Figure 3 - How the specific training (ST) sessions occurs* (n=134).

Table 2 - Characterization regarding the structure of the specific training (n = 134).

| Weekly frequency (n; %) | | Frequency of planning (n; %) | |
|---|--------------|--|----------|
| 1 time | 41 30.6% | Annually | 7 5.2% |
| 2 times | 54 40.3% | Semiannually | 11 8.2% |
| 3 times | 28 20.9% | Quarterly | 4 3.0% |
| 4 times | 4 3.0% | Bimonthly | 11 8.2% |
| 5 times | 2 1.5% | Monthly | 33 24.6% |
| Others | 5 3.7% | Weekly | 53 39.6% |
| | | During the session | 14 10.4% |
| Session duration in min [#] (x; ±dp) | 49.99 ±25.24 | They did not answer | 1 0.7% |
| Session duration in min (n; %) | | Analysis and assessment of goalkeepers' performance (n; %) | |
| < 25 min | 19 14.2% | No | 41 30.6% |
| 25 to 45 min | 50 37.3% | Video analytics | 14 10.4% |
| 46 to 60 min | 49 36.6% | Scouts | 34 25.4% |
| 61 to 90 min | 10 7.5% | Scouts and video analytics | 42 31.3% |
| 120 to 150 min | 6 4.5% | Others | 3 2.2% |

Legend: [#]average for 131 participants, 3 participants were excluded because answered that the session lasts less than 10 min.

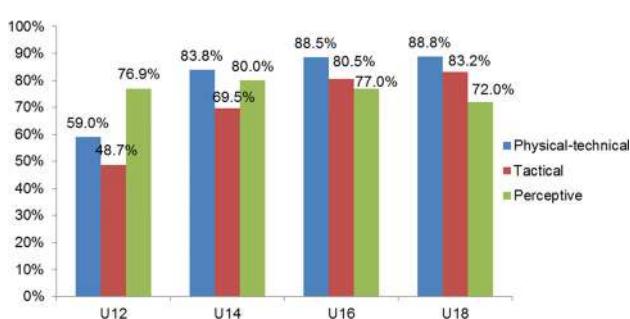


Figure 4 - Contents taught in each category (n=134).

the U12 teams with 48.7% and reaching the U18 teams with 83.2%. In terms of perceptual content, there is an increase from U12 to U14 teams and a decline in U16 and U18.

In all categories, part of the professionals stated that they taught the 3 contents, with 32.1% (n = 25) in U12, 50.5% (n = 53) in U14, 64.6% (n = 73) in U16 and 60.7% (n = 65) in U18.

Regarding the contents classified as others, 44 professionals used this option. However, in 37 of them, the contents described were associated with at least one of the 3 other categories. Among the 7 other answers that addressed other contents, in all of them, the professionals indicated working with psychological content.

Discussion

This study aimed to describe how specific training for goalkeepers of youth handball teams is planned and executed in Brazil. Initially, before investigating the structure of specific training, we had the first finding of this study that 71.1% of the participants stated that specific training for goalkeepers occurs in their youth teams. This result is relevant and can be considered unexpected, as the literature suggests that specific and systematic training for goalkeepers is infrequent, especially in handball youth teams^{12,13}.

In this regard, Salles et al.¹¹ found that 70.58% of female goalkeepers stated that they did not have specific training. However, this difference may be linked to the fact that in the aforementioned study, the athletes themselves answered the questionnaire. In the present study, we asked the professionals responsible for the teams. In this regard, there is still the possibility that the professionals overestimate the performance, organization, structuration, and emphasis of the training. In addition, each of the participants had as a starting point their understanding of what can be considered specific training for goalkeepers. Still, in the study by Salles et al.¹¹, only the female gender was investigated, and in our study, professionals who worked with males, females, and both were included. Finally, another possible reason for the discrepancy in the literature is the scarcity of studies investigating this phenomenon. This characteristic highlights the important contribution of the present study to a better understanding of this theme.

As for the general structure of the specific training session, about half of the participants indicated that it occurs with the goalkeepers and the person responsible for the training, but separately from the rest of the team. The fact that the goalkeeper needs specialized training does not imply that he/she should always and exclusively be separated from the other athletes since it is also important to have joint training in certain situations, such as collaboration with the defense and the ability to start both the quick attack and the fast break of teammates in a game situation¹⁴.

In addition, Castro et al.¹⁵ stated the need for specific training to be developed during all training moments (warm-up, main and final part). Moreover, the authors bring other possibilities for working with goalkeepers, namely: training aimed at improving the goalkeeper's autonomy; training with goalkeepers only (individually or in groups); general training for the goalkeepers, but also involving all the athletes of the team (working both on cooperation and on receiving shots from different athletes).

It is important to highlight that the other half of the respondents reported that specific training occurs with the entire team. In many cases, this format can also facilitate

professionals working alone. This makes it possible during the training of the entire team that there is a period in which attention is focused on the goalkeeper, even when there is no specialized or specific professional for this function. In this regard, a study¹⁶ carried out with coaches of U16 female teams from São Paulo state identified that the specific training was carried out both at different times and together with the other team athletes. This format allows that the performance involving game situations (with the other team athletes) is a strategy that enables the inclusion of psychological aspects, interaction with teammates, understanding of rules, decision-making, and physical capabilities¹⁶.

On the other hand, few professionals reported providing training for different categories and genders together. Greco⁵ highlights that training with female and male goalkeepers of different categories is a practice that allows the exchange of experiences and information and brings opportunities for incidental learning and by model, in addition to favoring the integration and cohesion of the team. Therefore, coaches must seek possibilities to carry out moments where different genders and categories can train together. In addition, some teams need training to be carried out together due to the modality structures in the country, considering that many trainings take place simultaneously in the same space.

As for the weekly frequency and duration of goalkeeper training, we found in our study that most perform 1 or 2 times a week and with an average duration of 49.99 (± 25.24) min. In the study by Salles et al.¹¹, most of the sample stated that they train rarely or only when they are near competitive events, which, according to the authors, highlights the coaches' disregard for the position. However, for Sá et al.¹⁷ it is opportune that youth players have varied possibilities of training activities and high-volume, aiming at expanding the training of athletes.

Regarding the planning of specific training, most participants reported planning weekly. However, the literature indicates the importance of planning in the medium and long-term overview because the process of training goalkeepers is a successive activity, not improvised, and aimed at achieving established objectives¹⁸. From a didactic and pedagogical point of view, a self-assessment must occur in each training session so that the following planning takes place¹⁹.

It is possible to infer that professionals carry out training planning weekly to improve deficiencies observed in championships or previous training sessions. On the other hand, as 62.7% of the professionals reported not having handball as their primary source of income, it is possible that the planning carried out weekly is also associated with the lack of time of these professionals to carry out the planning of specific training, considering who possibly need to dedicate their time to other activities that complement their income²⁰.

The analysis and assessment of goalkeepers' performance during matches and training sessions are mainly based on direct observation ('scout') and/or video analysis. Its execution makes it possible to identify relevant parameters (performance indicators) related to specific content taught in training sessions, thus bringing game situations closer to training^{21,22}. In addition, it is important to discuss the analysis with the goalkeepers, aiming at improving performance, reflecting on their actions, and learning about handball. In addition, the skills of observation and analysis of the game are important elements to goalkeepers^{23,24}. However, these parameters must be allied to the development needs of athletes.

Regarding the content taught during training sessions, only in the U12 teams does the physical-technical content not have the highest percentage of use. According to Moreno et al.⁸, the high use of this content in youth teams can bring difficulties in perception and decision-making. This use is combined with the other content. In addition, goalkeepers should not only emphasize repetition and automation of technical aspects, but they also need to improve their experiences in various perceptual-motor situations. This way, it will be possible to improve their motor repertoire and response capacity²⁵.

In this regard, a study that sought to characterize the specific training of goalkeepers was carried out through the observation of three training sessions of four male youth teams (U12, U14, U16, and U18), who played in clubs that played in the national first division affiliated to the Lisbon/Portugal Handball Association¹⁵. In the above study, the time dedicated to the goalkeeper had a predominance of technical preparation, followed by tactical preparation in all categories.

Despite the results for most categories indicating a superior use of physical-technical content, the use of tactical and perceptual content was also expressive. This is an important finding of our study, considering that all contents are relevant in developing youth goalkeepers, so the exclusion of some can lead to deficiencies in general and specific abilities⁸.

The goalkeeper needs to perceive the stimulus to react and make a decision at an appropriate time (tactical) to perform the motor action to avoid the goal (physical-technical)¹³. This highlights the importance of working together with all contents. Moreno et al.⁸ emphasize that tactical formation is the basis for developing the goalkeeper's technical standards. In addition, tactical aspects are closely associated with perceptive factors, which subsidize the goalkeeper for problem-solving and decision-making.

However, in U12 teams, our results revealed a low percentage of this joint work, although, in the other categories, more than half of the coaches teach these 3 contents. Technical staff must look for alternatives to combine and switch between the 3 contents in their

planning⁸. Castro et al.¹⁵ point to the absence of a development targeting all 3 components and reinforce the importance of the coaches implementing these contents in goalkeeper training.

In addition to the physical-technical, tactical, and perceptive content, a few participants reported the use of content related to the psychological preparation of goalkeepers. This aspect is directly linked to the goalkeeper's performance, being an important factor in training²⁶. However, the number of participants who reported using the content was low. Coaches may include this content in an unplanned way, so they have not mentioned it in their answers.

Conclusions

In terms of practical application, the present study provided important information that allows researchers and coaches to know more about the specific training of goalkeepers in the Brazilian youth handball teams. In addition, it allows professionals who do not carry out specific training to visualize how training for goalkeepers in handball youth teams has been carried out in the country. Our results may help coaches reflect on their practices, considering the importance of planning physical-technical, tactical and perceptual contents and the different possibilities of organizing training sessions.

Although our study has made important contributions to the understanding of how handball youth goalkeeper training occurs, some limitations need to be considered. As for the high percentage of participants reporting specific training in their teams, it is necessary to consider that coaches who did not have specific training in their team chose not to participate in the research when they received the invitation. However, to minimize these possibilities, the questionnaire title only mentioned handball female and male goalkeepers. In the Free and Informed Consent Form, it was stated that those who did not have specific training in their team could point out the reasons for the non-existence.

The selection of participants was based on convenience through the expansive network of contacts. Even a high number of participants presents limitations regarding representativeness for the population studied. However, it is important to note that there is no unified information on the number of existing coaches in Brazil, thus making a sample calculation impracticable²⁷. In addition, the low return of state federations regarding the availability of contacts made it difficult for a more significant number of participants from each of the states to access. This lack of collaboration from organizations may compromise the country's handball development.

It is also necessary to emphasize that the understanding of specific training for goalkeepers may not have been the same for each of the coaches. This explanation

was not included in the questionnaire, which was personal to each participant. In addition, there is the possibility that the professionals did not understand the explanations regarding the contents. However, the study made possible a better understanding of how specific training occurs in the country, partially filling the gap in the literature.

As suggestions for future studies, more detailed investigations are needed on the aspects presented. Such studies may include expanded descriptions, through on-site observations of training, of the activities developed to work on the content and methodological procedures used by the professionals responsible and investigating how they are planned and the variables involved in the training process. Finally, these descriptions can still consider the differences and similarities between categories and genders. Still, it is important to understand if the planning of the training sessions occurs and if they are made during the season or only by demand. Moreover, it would be important to see what the coaches understand for specific training.

In conclusion, our results indicate that the specific training of goalkeepers occurs for most youth handball teams, and the contents taught involve physical-technical, tactical, and perceptual aspects for all categories. In general, the teams analyze and assess the goalkeepers' performance, predominating the planning of training weekly. The training is mainly structured once or twice a week, lasting 25 to 60 min, and given by the team's leading coaches.

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