GOALKEEPER PERFORMANCE: ANALYSIS OF GOALKEEPERS' CONTRIBUTION TO THEIR TEAM'S BUILD-UP UNDER THE OPPONENT'S PRESSURE IN THE 2018 WORLD CUP

Dimitrios Mikikis,[1, A, B, D] Yiannis Michailidis,[2, A, D] Athanasios Mandroukas,[3, B, D] George Mavrommatis,[4, B, C] Thomas Metaxas[5, A, D]

[1] ORCID: 0000-0001-6862-8230. Laboratory of Evaluation of Human Biological Performance, Department of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece
[2] ORCID: 0000-0002-9738-7373. Laboratory of Evaluation of Human Biological Performance, Department of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece
[3] ORCID: 0000-0001-6600-2656. Charles University, Faculty of Physical Education and Sport, Prague, Czech Republic
[4] ORCID: 0000-0001-5959-2168. Laboratory of Evaluation of Human Biological Performance, Department of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece
[5] ORCID: 0000-0003-1438-5741. Laboratory of Evaluation of Human Biological Performance, Department of Physical Education and Sports Sciences, Aristotle University of Thessaloniki, Greece

[A] Study Design; [B] Data Collection; [C] Statistical Analysis; [D] Manuscript Preparation

Address for correspondence:
Yiannis Michailidis
Special Teaching Staff – Soccer, Laboratory of Evaluation of Human Biological Performance
Department of Physical Education and Sports Sciences, Aristotle University of Thessaloniki
New Buildings of Laboratories, P.O. 57001, University Campus of Thermi, Thessaloniki, Greece
E-mail: ioannimd@phed.auth.gr

Abstract The purpose of this study was to analyze in FIFA World Cup Tournament 2018 focusing on the technical and tactical offensive actions of the male goalkeepers when being under pressure and to evaluate if their actions correlated with the outcome of the match. The sample consisted of the goalkeepers (n = 41). A descriptive analysis and a hierarchical clusters analysis were performed to identify the goalkeepers' classes. Furthermore, a factor analysis was conducted to locate the goalkeepers' style of play and the statistical significance was set at $p < 0.05$. The results showed that the total percentage of correct passes under pressure was 46.5% and that the goalkeepers preferred using the air and long distance passes with one or two touches. In addition, out of the 4 groups that were formed with cluster analysis, the goalkeepers of group 2 and 3 stood out concerning the quality of their actions. The incorrect actions were correlated with defeat and the correct actions were correlated with a win ($p < 0.001$, $r = 0.663$). In conclusion, a male goalkeeper, nowadays, needs to have all the technical actions of his feet at a good level so he can contribute to his team's build-up, especially those of distributing the ball with his feet.

Key words soccer, goalkeepers, offense, build-up, passes

Introduction

In soccer, as in all sports, it is all about winning the match. In international tournaments, teams are judged on their ability to win matches (Luhtanen, Belinskij, Hayrinen, Vanttinen, 2001). One such tournament is the FIFA (Federation Internationale de Football Association) World Cup Tournament. Video analysis is a medium that involves recording performance via digital camera or specific software and that video is used along with notational analysis or software algorithms to analyze the video (Spalding, 2017). In the past few years, video performance analysis has started being used by teams to improve their winning results. Therefore, more and more teams are taking on a video performance analysis coach. As soccer players have always sought to improve their performance, the analysis is usually done based on the professional experience to observe the objective and subjective questions of a soccer player.

All match analysis can be conducted for a team, sub-team or even for an individual level. Each soccer player plays a role in a soccer team, and a goalkeeper's role is vital. A goalkeeper is special because he is the team's last line of defense and the first line of offense (Hadjar, Koutchouk, Mime, Zerf, Zereg, 2016). When looking at the overall picture, only the goalkeeper stands out from his teammates because of his different attire. Something which differentiates a goalkeeper from other footballers is that when his team is defending and when he is in his box, he can come in contact with the ball using his hands. This alone makes the analysis of a goalkeeper's performance very specific. While goalkeepers are not fully nor directly involved in collective actions on offense for the team, they are the final critical barrier to the opponent scoring goals, and thus winning or losing a match (Hazlewood, 1998).

A goalkeeper's performance analysis is performed on all four phases of the match, which are the ball possession (offense) phase, defensive transition phase, defense phase and the attacking transition phase. As a result, due to the particularity of the goalkeeper's position, most analysis and research have been conducted regarding the goalkeeper's defense phase. In recent years, however, due to the match play and offense development of most teams, trying to keep the ball possession for a longer period of time, makes it imperative to analyze the goalkeeper's performance during the attacking transition and attack phase and ultimately, his contribution to his team build-up. Moreover, goalkeeper training sessions must also aim at improving the ability to control and manipulate the ball (Hadjar et al., 2016).

A goalkeeper's contribution to the team's defense is of most importance since, as mentioned above; he is the only one who can touch the ball with his hands. Recently, in order for the match to become more direct, it has been forbidden for the goalkeeper to come in contact with the ball with his hands after the transfer of his partner (except for a few exceptions) (Ito, Ito, Wakasugi, Takemiya, Asami, 2004). This led to the need for the goalkeepers to improve their foot techniques, making their play look more similar to that of the rest of the players (Ito et al., 2004).

In recent years, the trend in soccer (the way in which teams are earning titles) is to push the ball high up, to regain the ball to the attacking third and to have a quick goal with an average of 4 passes before a goal is scored (UEFA 2016/2017 Technical report). This has prompted teams which start their build-up from the back, to look for ways to deal with the pressure of the opponents in their defensive third of the field. "The goalkeepers at this World Cup were really versatile" Pascal Zuberbuhler (FIFA 2018) "Goalkeepers often used quick, short throws or passes to launch attacks" Pascal Zuberbuhler. It is obvious that certain teams have a clear plan to quickly transition when their goalkeeper has the ball, with the outfield players providing various options. The goalkeeper, nevertheless, played a key role and had to display quick thinking and decision making when playing the ball out (FIFA 2018).

The originality of the current study is to present the goalkeeper's choices when having the ball in possession and when the opponent pressures the goalkeeper's team into their defensive third. It also clarifies whether these

choices play a vital role in the team's build-up and the outcome of the match. The purpose of this study is to look into four key factors in FIFA World Cup Tournament 2018 and those being: 1) The participation of the goalkeeper in the build-up of the team. 2) Finding the type of pass that the goalkeepers mostly use when being under pressure. 3) The success rate of the goalkeeper's passes when being under pressure and when not under pressure. 4) If there is a correlation between the percentage of successful passes by the goalkeepers and the outcome of the match.

Material and methods

Subjects

The sample was taken from the male goalkeepers who participated with their national teams in the 2018 World Cup. There was a total of 64 matches and a total of 41 goalkeepers (age: 30.6 ±4.4 years; height: 1.89 ±0.05 cm; Weight: 83.3 ±7.0 kg) who took part in it. A video analysis of all parts of the World Cup matches involving the goalkeepers was used. Furthermore, out of the 64 matches 128 videos were created and analyzed which included all the actions of each goalkeeper per game. Additionally, the 128 videos were cropped and analyzed in 4,015 footages for each individual action of each goalkeeper.

Procedure

All parts of the World Cup matches involving the goalkeepers were recorded after viewing the entire match of television broadcasts. The video analysis program which was used was the Sport Scout. The matches were analyzed through systematic observation according to Lames (1991, 1994) and Singer and Willimczik (2002). For the recording, a match observation leveled board was used which was based on past studies (Loy, 1992; Loy, 1995; Theis, 1992a; Theis, 1992b). Every part of the World Cup matches involving the goalkeepers was analyzed by two experienced observers who were specially trained for the accurate and reliable data recording. The inter-rater reliability of the two separate observers was calculated to guarantee the quality of the observation system and a reliability index of 0.96 was observed (k index). The research team maintained the anonymity of players and teams following European Data Protection Law. In addition, the study was approved by the Ethics Committee of Aristotle University of Thessaloniki.

Analysis Variables

The variables analyzed in this study mostly concentrated on the actions of the goalkeepers when having the ball at their feet and being under pressure (pass or dribble an opponent). Secondly, there are variables of the actions of the same goalkeepers when having the ball at their feet without being under the opponents' pressure. Finally, there were also variables which were analyzed and refer to the goalkeepers' defensive actions. These actions are: save, smothering, blocking, tipping, catching, punching, or parrying a shot which prevents the opponent from scoring (caught or blocked with the body) and also throwing – when the goalkeeper passed the ball to a teammate or started an attack by throwing the ball either underhand or overhand (Spalding, 2017). A goalkeeper's passes under pressure had been characterized as the ones where the opponent is less than ten meters away from the goalkeeper in his last contact with the ball and the opponent moves actively towards it. Moreover, it was investigated whether the goalkeeper's actions were correlated with the result of the match.

Classification of Passes

The passes recorded were divided into two categories: a) Passes under the pressure of the opponent (analyzed variables) and b) Passes without the opponent's pressure.

Furthermore, the passes under the pressure of the opponent were divided into the following categories:

– According to the distance of the pass to short distance pass (<23 m) and long distance pass (>23 m) (Liu, Gomez, Lago-Penas, 2015).

– As far as, the height of the ball when passing is concerned, the passes were divided into on the ground passes and in the air ones.

– As for the contacts made by the goalkeeper, they were divided in one-touch pass, a two-touch pass, three or more touch passes and dribbling an opponent before passing the ball.

All the passes were separated into correct passes and incorrect ones. The correct passes have been characterized as all the passes which final recipient was a goalkeeper's teammate in order for the possession of the ball to be continued by the goalkeeper's team. On the other hand, incorrect passes were considered as the ones which the final recipient of the ball was a goalkeeper's opponent, and which resulted in the possession of the ball being lost by the goalkeeper's team. When the ball was claimed by players from both teams, then the pass was deemed correct when the ball ended up in the possession of the goalkeeper's team. However, the pass was deemed to be incorrect when the ball went to the opponent's possession. The classification of the passes is presented in Figure 1.
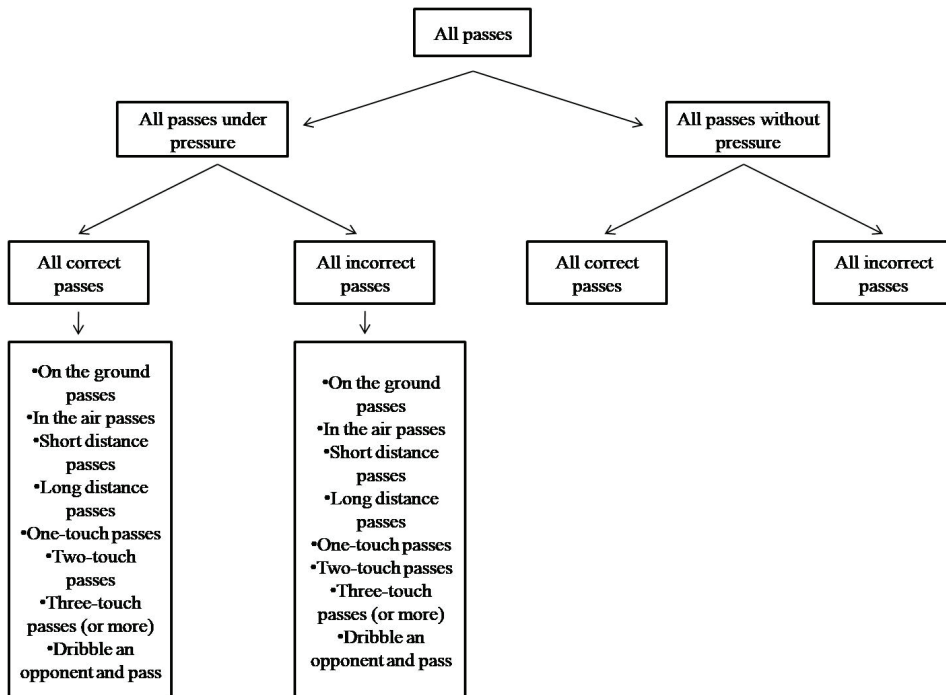

**Figure 1.** Classification of goalkeepers' actions

Statistical analysis

All of the data was analyzed using the statistical package for PC SPSS 25.0. Firstly, a descriptive analysis of the data was conducted (frequency, average, standard, deviation). Hierarchical Clusters Analysis was conducted at standardized prices to identify goalkeeper classes and then, through fluctuation analysis, the nature of the classes was specified. The standardization of the data was done by dividing the absolute values with the appearances. Furthermore, Factor Analysis was conducted to locate the goalkeeper's style of play and the statistical significance was set at $p < 0.05$.

Results

Descriptive Statistics

The total passes of all the players were 49,651 (FIFA, 2018), 3,005 passes were played by the goalkeepers making up 6% of the total passes. The total percentage of correct passes under pressure was 46.5%. In comparison to the total percentage of incorrect passes under pressure which was 53.5%. On the other hand, the total percentage of correct passes without pressure was 65.72% whereas, the total percentage of incorrect passes without pressure was 34.28%.
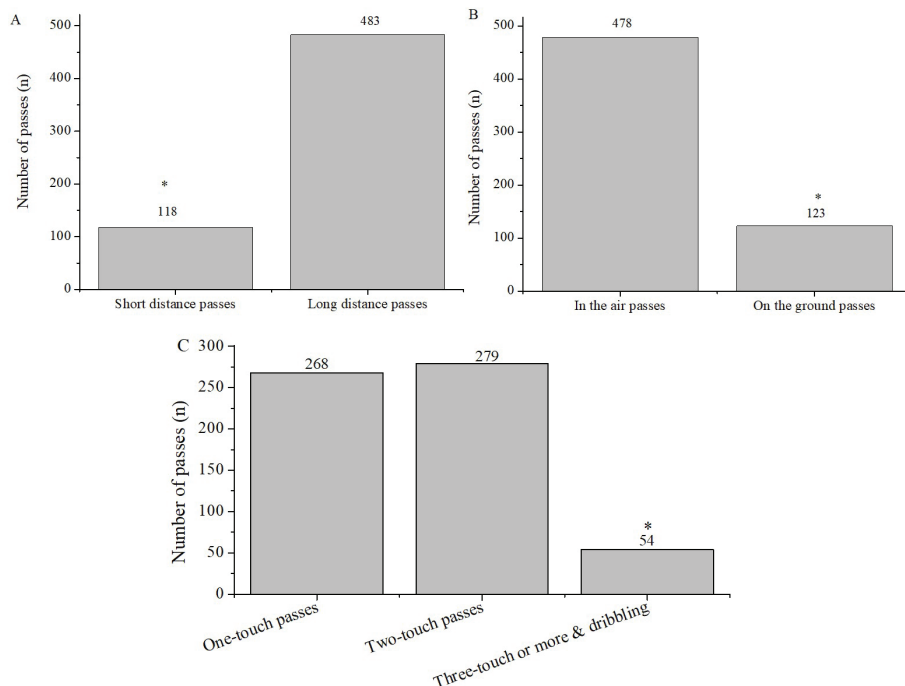
A. Type of pass in relation to length. B. Type of in relation to height. C. Type of pass in relation to touches.

* Denotes a significant difference ($p < 0.05$).

Figure 2. Type of pass under pressure

When the goalkeepers were under pressure, the air passes were mostly used at an overwhelming 79.53% while the on the ground ones were a mere 20.47%. In addition, when the goalkeepers were under pressure, they mostly distributed long distance passes, which was an overwhelming 80.36% of the times in comparison to short distance passes which only made up 19.64% of them. Regarding the contacts used by the goalkeepers when they were under pressure, the following was noted: Two-touch passes 46.42%, one-touch passes 44.59%, three or more touch ones and dribbling 8.99%. The absolute values for each kind of passes are presented in Figure 2.

Total passes without the opponent's pressure were a total of 2,404, which 65.7% (1,580) of them correct passes and 34.3% (824) of them as incorrect passes.

All goalkeepers' passes come to 3,005 while the goalkeepers' clearly defensive actions come to 1,010. As a result, the goalkeepers' match was 74.8% with their feet during the attacking transition phase or the attacking phase of their team and 25.2% with the goalkeepers' exclusive actions during the defensive transition phase or the defense phase of their team.

Factor analysis, and hierarchical cluster analysis results

The factor analysis which was used to locate the goalkeepers' style of play showed the following three goalkeeper styles (factors: factor 1 – All actions, factor 2 – Correct and Incorrect passes, factor 3 – Incorrect actions). The three factors explain 65.9% of the total variance (1st factor 33.3%, 2nd factor 24.8% and 3rd factor 7.8%). The results of the analysis and factor loadings are presented in Table 1.

Table 1. Results of Factor analysis with factor loadings higher than 0.4

Variable	Factor 1	Factor 2	Factor 3
1	2	3	4
All incorrect passes	0.883		
Participations	0.865		
Goals for	0.858		
All passes	0.839	0.504	
All incorrect passes without pressure	0.831		
Wins	0.818		
Goalkeepers' all actions	0.818		
All correct passes without pressure	0.710	0.594	
All correct passes	0.693	0.643	
Incorrect in the air passes	0.685	0.591	
Incorrect long distance passes	0.683	0.601	
All incorrect passes under pressure	0.683	0.592	
All incorrect one-touch passes	0.643		
Correct long distance passes	0.635	0.596	
Correct in the air passes	0.625	0.574	
Goals against	0.439		
Correct on the ground passes		0.810	
Correct short distance passes		0.807	
All correct passes under pressure	0.527	0.801	
Correct three-touch or more passes		0.794	
Correct two-touch passes	0.560	0.700	
Incorrect two-touch passes	0.573	0.648	

	1	2	3	4
Correct one-touch passes		0.454	0.561	
Dribble an opponent & incorrect pass			0.472	
Incorrect on the ground passes				0.858
Incorrect short distance passes				0.767
Incorrect dribbling				0.642
Incorrect three-touch or more passes				0.514

The relationships between the factors produced by factor analysis and the results of the matches are presented in Table 2.

Table 2. Correlations between passes variables and result of the match

Action	Wins	Defeat	Draw
All passes	r = 0.712 p < 0.001	r = 0.296 p > 0.05	r = 0.341 p < 0.05
All correct passes	r = 0.663 p<0.001	r = 0.266 p>0.05	r=0.321 p<0.05
All incorrect passes	r=0.312 p>0.05	r=0.290 p>0.05	r=0.295 p>0.05

A hierarchical cluster analysis was performed, and the phase of the classes was checked through the fluctuation analysis and the statistical analysis with absolute values. Standardized data was derived by dividing absolute values with the number of matches that each goalkeeper participated in. From the cluster analysis the goalkeepers were separated into 4 groups with the following characteristics (Table 3).

Table 3. Cluster analysis results and goalkeepers' classification

1st Class	2nd Class	3rd Class	4th Class
Smaller number of passes in comparison with the 2nd and 3rd axis. Larger number of correct passes in comparison with the 4th axis.	Big number of passes which are mostly correct.	Less amounts of incorrect passes in comparison with the rest goalkeepers.	Smaller number of passes in comparison with the 2nd and 3rd axis. Larger number of incorrect passes in comparison with the 1st axis.

Discussion

Nowadays, goalkeepers play an offensive role which is very important to the implementation of the team's match model (Sainz de Baranda, Adán, García-Angulo, Gómez-López, Nikolic, Ortega-Toro, 2019). In a previous study by Sainz de Baranda, Ortega, Garganta (2005), the characteristics of goalkeepers' offensive interventions in the matches of the 2002 World Cup of Korea and Japan was examined and they also observed a total of almost 30 actions per goalkeeper in a match. Furthermore, they observed that the goalkeepers use the long actions (~ 62%) more often and the central axis for their action (~42%). In the same study, it was mentioned that a total of 63%

of the attacks were started by the goalkeeper. Additionally, Shamardin, Khorkavyy (2015) in organizational structure of technical and tactical training of skilled goalkeepers in football observed that distribution of the goalkeepers is considered to be the start of an attack and happens 69.4% of game time, without thought separating their passes using their feet from those using their hands. Moreover, Spalding (2017), the technical and physical match demands of a NCAA soccer goalkeeper were examined, and it was observed that the most common technical action by the goalkeepers across all matches was the goal kick, and in 2014 the most common technical action was foot control.

The results of several studies have indicated that goalkeepers' interventions in their teams' build-up have increased. More specifically, Yague and Martin (1995) in the 1994 World Cup in the United States mentioned an average of ~25 actions, Sainz de Baranda and Serrato (2000) in the 1998 World Cup in France registered of ~26 and Sainz de Baranda (2002) in the 2000 European Championship observed an average of ~28 actions. More recently, Sainz de Baranda, Ortega and Palao (2008) in the 2002 World Cup mentioned an average of ~30 actions and in the women's 2011 World Cup Sainz de Baranda et al. (2019) observed an average of ~30 actions.

In the present study, which concerned only male goalkeepers, the goalkeepers applied more offensive actions. More specifically, in the World Cup of 2018 in Russia an average of ~36.64 actions per goalkeeper per match was noticed. Additionally, the literature on the technical and tactical role of the goalkeepers in tournaments in the past 10 years are limited (Garcia-Angulo, Ortega, 2015; Sainz de Baranda et al., 2019). However, it should be mentioned that soccer is a dynamic match and many changes have taken place in the style of match over the past decade. As it can be observed from the most recent UEFA technical reports of the European Champions League tournaments (2016/2017 & 2017–2018) the teams put pressure on their opponent's defensive third of the field. For the teams to be able to beat the opponent's high pressure they have started using their goalkeepers more actively so they can outnumber their opponents and create a greater depth in the pitch in order to keep the ball in possession and continue their build-up.

In the present study, Group 2 shows a higher number of passes in all categories compared to the rest of the groups. The goalkeepers in this group are good at distributing the ball using their feet with the biggest differences when compared to the other groups being: correct passes on the ground, correct short distance passes, correct long distance passes, incorrect long distance passes, correct two-touch passes, correct three or more touch passes. Group 3 has the fewest incorrect passes in all categories in comparison to the other goalkeeper groups. The goalkeepers in Group 1 and Group 4 play less with their feet during their matches than the goalkeepers in Groups 2 and 3. Group 1 goalkeepers have a higher number of correct passes than the goalkeepers in Group 4. In addition, in group 4, teammates do not play enough with their goalkeepers giving the impression that these teams have not evolved their match style because they do not play with their goalkeepers when their teams are under pressure. It seems that the goalkeepers with the highest market value of the world (Transfermarkt) were placed in group 3.

To sum up, two groups stand out from the rest. Group 2 which has a large number of passes and who successfully respond most of the times and group 3, which is characterized by less activity (fewer number of passes) but having the highest percentage of correct passes (limited errors). The remaining goalkeepers are separated into two categories, which have significantly less activity than the ones, in Group 1 and Group 4. Out of these two teams, Group 1 is characterized by a larger number of correct passes than Group 4 and the choice of the action and the execution of the action are in accordance with the goalkeeper's quality. Similar findings have been mentioned by previous researchers (Sainz de Baranda et al., 2019; Seaton, Campos, 2011; Szwarc, Lipinska, Chamera, 2010).

The factor analysis showed that 69.9% of the total information corresponds to the first 3 axes. The first axis, corresponding to about 33.3%, is the axis of the "All actions", that is, this axis is associated with all the variables corresponding to the actions of the goalkeepers. It could be supported that it is the table of all the activities of the goalkeepers. The second axis, ("Correct and Incorrect passes") which corresponds to 24.8% of the information, is distinguishable, on the one hand, by the incorrect actions (passes) of the goalkeepers and on the other, by the correct ones. In the third axis ("Incorrect actions"), which corresponds to 7.8% of the total variation, the following was noticed concerning the variable defeats, the variables corresponding to the actions that have to do with the goalkeeper playing in his box, such as an incorrect three-touch pass, incorrect short distance pass, correct three-touch pass, dribble an opponent and an incorrect pass, goalkeeper defensive actions, whether the long distance passes are correct or not. On the other hand, around the variable "wins" rely variables mainly corresponding to a play of correct passes in a short distance and particularly correct one-touch passes, correct short distance passes and correct passes on the ground.

Therefore, from the second and third axes, the correlation between the variables "wins" and "draw" with the actions of the goalkeepers can be seen, and more specifically the variable "all passes" and "all correct passes" of the goalkeeper correlated with the variables "wins" and "draw".

Conclusion

In conclusion, in the 2018 World Cup it appeared that the teams, in order to overcome the pressure of their opponents, used their goalkeepers more in their build-up so they could outnumber their opponent and create a greater depth in the pitch.

The goalkeepers who had a good technique in distributing the ball with their feet, combined with being aware of their team's tactics, could provide additional solutions to their team's build-up when the opposing team puts pressure on their defensive third of the field.

Following the separation of goalkeepers into 4 Groups through the statistical analysis, it seems that the goalkeepers in Group 3, who had the highest percentage of correct passes, are placed among the world's most valuable goalkeepers (Transfermarkt).

Goalkeepers nowadays should not only train and improve their defensive goalkeeping techniques, but also train and improve their technical and tactical actions, especially those of distributing the ball with their feet, which will contribute to their team's build-up.

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