

The grip dispute (*kumi-kata*) in judo: A scoping review

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Abstract

In judo combat, the grip (*kumi-kata*) helps to control and to dominate the opponent, and per the current rules is a prerequisite to executing a throwing technique. In this scoping review, articles and reviews published in scientific journals in English were searched in Web of Science, Scopus, PubMed and SPORTDiscus databases from inception until December 2020. The studies were classified into technical-tactical or time-motion analyses, grip or grip attempts, grip locations on *uke*'s (athlete receiving the attack) *judogi* (judo uniform) or hands that performed the grips, and one or two hands holding. Articles evaluating the physical and physiological capacities of grip dispute were excluded. From 286 articles identified, 41 were included in the final selection. Two reviewers screened the records independently for eligibility. One reviewer extracted all data and the other reviewed the data for accuracy. The main results showed that: i) more experienced athletes hold the *judogi* for less time before attacking and focus their vision on the face and collar; ii) male athletes, especially heavy ones, hold longer in the *judogi* and use more defensive grips (collar and collar); iii) the most used grip was collar and sleeve; iv) the most used position was *kenka-yotsu* (opposite sides). The result of this scoping review may assist coaches and athletes to develop training strategies according to the athletes' technical-tactical objectives, as well as future investigations that can be conducted related to grip dispute in judo.

Keywords: Martial arts; combat sports; judo; notational analysis; performance; gripping; *judoka*.

La disputa de agarre (*kumi-kata*) en judo: una revisión panorámica

Resumen

En el combate de judo, el agarre (*kumi-kata*) ayuda a controlar y dominar al oponente y, según las reglas actuales, es un prerrequisito para ejecutar una técnica de proyección. En esta revisión panorámica, se buscaron artículos y revisiones en inglés publicados en revistas científicas en las bases de datos Web of Science, Scopus, PubMed y SPORTDiscus, desde su inicio hasta diciembre de 2020. Los estudios se clasificaron en análisis técnico-tácticos o de tiempo-movimiento, agarre o intentos de agarre, zonas de agarre en el *judogi* (uniforme de judo) del oponente (*uke*) o manos que realizaron los agarres, y agarre a una o dos manos. Se excluyeron los artículos que evaluaron las capacidades físicas y fisiológicas implicadas en la disputa de agarre. De los 286 artículos identificados, 41 se incluyeron en la selección final. Dos revisores examinaron los registros de forma independiente para determinar su elegibilidad. Un revisor extrajo todos los datos y el otro revisó la exactitud de los datos. Los principales resultados mostraron que: i) los atletas más experimentados agarran el *judogi* durante menos tiempo antes de atacar y enfocan su visión en la cara y el cuello; ii) los atletas masculinos, especialmente los pesados, agarran el *judogi* durante más tiempo y utilizan agarres más defensivos (solapa y solapa); iii) el agarre más utilizado fue el de manga y solapa; iv) la posición más utilizada fue

A pegada (*kumi-kata*) no judô: Uma revisão de escopo

Resumo

No combate de judô, a pegada (*kumi-kata*) auxilia no controle e domínio do oponente e de acordo com as atuais regras é um pré-requisito para a execução da técnica de arremesso. Nesta revisão de escopo, os artigos e as revisões publicadas em inglês e em revistas científicas foram selecionadas nas bases de dados Web of Science, Scopus, PubMed and SPORTDiscus, desde o início até dezembro de 2020. Os estudos foram classificados em análises técnico-táticas e temporais, pegada e tentativa de pegada, locais de agarres no *judogi* (uniforme do judô) do *uke* (atleta que recebe o ataque) ou as mãos que realizaram esses agarres, e uma ou duas mãos segurando. Os estudos que avaliaram as capacidades físicas e fisiológicas da pegada foram excluídos. Dos 286 artigos identificados, 41 foram incluídos na seleção final. Dois revisores selecionaram os registros independentemente de acordo com a elegibilidade. Um revisor extraiu todos os dados e o outro os revisou quanto à acurácia. Os principais resultados mostraram que: i) atletas mais experientes seguram no *judogi* por menos tempo antes de atacarem e centralizam o foco visual no rosto e na gola; ii) atletas masculinos, especialmente os pesados, seguram por mais tempo no *judogi* utilizando pegadas mais defensivas (gola e gola); iii) a pegada mais utilizada foi gola e manga; iv) a posição mais utilizada foi *kenka-yotsu* (lados opostos). Os

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kenka-yotsu (agarre a lados opuestos). El resultado de esta revisión panorámica puede ayudar a los entrenadores y atletas a desarrollar estrategias de entrenamiento de acuerdo con los objetivos técnico-tácticos de los deportistas, así como futuras investigaciones relacionadas con la disputa del agarre en judo.

Palabras clave: Artes marciales; deportes de combate; judo; análisis notacional; rendimiento; agarre; *judoka*.

resultados desta revisão de escopo podem auxiliar os técnicos e os atletas a desenvolverem estratégias de treinamento de acordo com os seus objetivos técnico-táticos, assim como, a futuras investigações que podem ser conduzidas relacionadas à disputa de pegada no judô.

Palavras-chave: Artes marciais; desportos de combate; judô; análise notacional; desempenho; agarre, *judoca*.

1. Introduction

Judo combat starts with the athletes standing upright, facing each other and after the referee's *hajime* (start) command (International Judo Federation, 2019). From this moment, the athletes perform displacement actions, while keeping a visual tracking of the opponent's body searching for the optimal points to grab (Piras et al., 2014). This phase is denominated as grip dispute (*kumi-kata*) and can be divided into two stages: grip attempts and grip (Calmet et al., 2010; Soriano et al., 2019). The stabilisation of the grip in the opponent's *judogi* (judo uniform), the ultimate goal of this phase, is a prerequisite to executing a throwing technique (Calmet et al., 2010). Indeed, the application of the throwing technique without holding the opponent's *judogi* is considered an infraction (International Judo Federation, 2019).

The grip provides intrinsic somaesthetic and opponent information (Margnes & Paillard, 2011), which help athletes to establish attack positions (Courel-Ibáñez et al., 2014) and to control the intensity of technical-tactical actions used during judo combat (Kons et al., 2018). The grip dispute in international matches can represent ~60% of the total time of the effort-pause sequence (*hajime* to *mate*, start to stop) (Soriano et al., 2019). With this, experienced athletes invest more time in the grip dispute (Calmet et al., 2010), focus the visual field in central areas such as face and collar (Piras et al., 2014) and execute the attack more quickly compared to beginner athletes (Calmet et al., 2010). On the other hand, international female athletes hold the *judogi* with both hands for longer (Soriano et al., 2019), whereas heavier athletes use more defensive grips (Barreto et al., 2019; Dal Bello et al., 2019). In this sense, the intelligent use of more defensive technical-tactical actions can result in effective strategies in increasing the penalties received by the opponent (Brito, Moreira, et al., 2017).

In the last 10 years, many adjustments have been made to the rules of judo matches. The main changes were the exclusion of *koka* and *yuko* scores, reduction of the combat time of senior male and female athletes from 5 min to 4 min, the prohibition of grips on the lower limbs in attacks and counterattacks, no time limit for the golden score and reduction of *osaekomi* time from 25 s to 20 s (International Judo Federation, 2010, 2013, 2015, 2017, 2019). The current rules of the International Judo Federation (IJF) allow the "collar and sleeve" grip to be maintained for 45 s without causing a penalisation with *shido* (penalty), however, the athlete must avoid the so-called "negative judo" (lack of offensive actions). Other types of grips can be interpreted as defensive (i.e., sleeve and sleeve, collar and collar, cross sleeve, cross collar) and if the athletes do not perform an attack after executing them, they can be penalized with *shido* (International Judo Federation, 2019). This rule has the objective of favouring "positive judo", making the combat more dynamic, thus being more attractive to the public (Boguszewski et al., 2014).

The *shido* is a penalty that does not represent a score, but it is cumulative and, when receiving three *shido*, the athlete may be disqualified from the combat by *hansoku-make* penalty (International Judo Federation, 2019). Upon receiving the first *shido*, the athletes increase between one time (Balci & Ceylan, 2020) and ~3 times the chances of losing the match, especially in the heavier categories; with this, they start to perform more offensive actions in an attempt to reduce the probability of being defeated (Escobar-Molina et al., 2014). However, once a new rule is set, some athletes start to search for opportunities to use it to their advantage either by inducing more penalties to their opponents or by executing defensive actions while avoiding being penalized (Brito, Moreira, et al., 2017; Calmet et al., 2017; Franchini, Takito, et al., 2013).

Part of these technical-tactical actions adopted by the athletes is related to the grip dispute. To the best of our knowledge, there are no review studies in the literature that discuss this topic



extensively, based on selected investigations. Therefore, the objective of this scoping review was to analyse the influence of grip dispute in the judo combat in different ages (Miarka et al., 2012, 2014), weight categories (Brito, Moreira, et al., 2017), sexes (Sterkowicz-Przybycień et al., 2017), results (Miarka, Fukuda, Heinisch, et al., 2016) and competitive levels (Calmet et al., 2010; Miarka, Del Vecchio, et al., 2016; Miarka, Fukuda, Del Vecchio, et al., 2016). With accurate information on how the grip dispute can be differentiated into different groups, coaches and athletes will be able to plan more specific training and combat strategies, tailoring better defined technical and tactical objectives for their athletes.

2. Methods

This scoping review was based on the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) (TRICCO et al., 2018).

2.1. Eligibility criteria

The eligibility of the studies was based on the following criteria: 1) no restrictions on age, sex, weight categories, competitive level and competition phases; 2) observational and experimental studies were included; 3) studies that performed time-motion and technical-tactical analyses; 4) articles that assessed frequency and time of grip; 5) studies that evaluated the types of grips, the places of grips in the *judogi* as well as the hands that performed these grips; 6) with or without comparison between groups; 7) studies that divided the grip dispute into grip attempts and grip; 8) published in English; 9) published until 2020; and 10) published as full-length journal articles or reviews (i.e., other document types such as doctoral dissertations, books, book chapters, conference proceedings/abstracts, were not considered for inclusion). Studies were excluded based on the following criteria: 1) studies that did not specifically present either the grip locations in the *judogi* or the hands that performed these grips, for example, studies that evaluated the grip only as a time-motion combat action without specifying how it was performed; 2) articles involving physiological, biomechanics and anthropometric characteristics such as muscle strength, power, endurance, speed, levers, torques, balance, body composition, somatotype, motor performance and physiological markers (e.g., lactate).

2.2. Information sources

The databases used in the search were the Web of Science (Core Collection, Current Contents Connect, KCI - Korean journal database, Russian Science Citation Index and SciELO Citation Index), Scopus, PubMed and SPORTDiscus with Full Text. Snowballing technique (Sayers, 2007) was used to search for articles not retrieved from these databases.

2.3. Search strategy

The search strategy consisted of a combination of the following words related to the topic under study: judo, time-motion, technical-tactical, *kumi-kata*, grasp, grappling, grab, gripping, grip, *kumite*, *kumi-te*, handgrip and hand-grip. Table 1 shows the specific search strings used for each database.

2.4. Selection process

The search in the selected databases resulted in 574 articles found (Web of Science = 212; Scopus = 171; PubMed = 66; SPORTDiscus = 125). The Rayyan automation tool (Ouzzani et al., 2016) was used in the selection process and assisted eliminate 290 duplicate articles. Two reviewers (R1 and R2) independently reviewed titles and abstracts of the 284 records, then 229 articles that do not comply with the eligibility criteria were excluded, 31 were included for full reading, 22 were classified as “maybe” and there were two conflicts. The 24 articles that did not have immediate agreement were read in full to verify compatibility with the review. Then 16 were excluded after verifying in the methods section the non-inclusion and specification of how the grip was performed. After this selection, both researchers agreed to include 39 studies. Two more articles were added by the snowballing technique, resulting in a total of 41 articles included in this review.



Table 1. Search strings used in the scoping review.

Database	Search string
Web of Science	(TS=(judo and (time-motion or technical-tactical or kumi-kata or grasp or grappling or grab or gripping or grip or kumite or kumi-te or handgrip or hand-grip))) AND PY=(1864-2020). Results refined by: Article and Review Articles (Document Types) and English (Languages). Accessed October 24, 2021.
Scopus	(TITLE-ABS-KEY (judo AND (time-motion OR technical-tactical OR kumi-kata OR grasp OR grappling OR grab OR gripping OR grip OR kumite OR kumi-te OR handgrip OR hand-grip)) AND LANGUAGE (english)) AND PUBYEAR > 1959 AND PUBYEAR < 2021. In results was selected in Refine By: Article and Review (Document Type). Accessed October 24, 2021.
PubMed	((([judo[Title/Abstract] AND (time-motion[Title/Abstract] OR technical-tactical[Title/Abstract] OR kumi-kata[Title/Abstract] OR grasp[Title/Abstract] OR grappling[Title/Abstract] OR grab[Title/Abstract] OR gripping[Title/Abstract] OR grip[Title/Abstract] OR kumite[Title/Abstract] OR kumi-te[Title/Abstract] OR handgrip[Title/Abstract] OR hand-grip)[Title/Abstract]) AND (["1996/01/01"[Date - Publication] : "2020/12/31"[Date - Publication]]) AND (English[Language])) AND (Journal Article[Publication Type] OR Review[Publication Type] OR Systematic Review[Publication Type])). Accessed October 24, 2021.
SportDiscuss with full text	TI (judo and (time-motion or technical-tactical or kumi-kata or grasp or grappling or grab or gripping or grip or kumite or kumi-te or handgrip or hand-grip)) OR AB (judo and (time-motion or technical-tactical or kumi-kata or grasp or grappling or grab or gripping or grip or kumite or kumi-te or handgrip or hand-grip)) OR KW (judo and (time-motion or technical-tactical or kumi-kata or grasp or grappling or grab or gripping or grip or kumite or kumi-te or handgrip or hand-grip)). Accessed October 24, 2021.

Note: TS = Topic; TI = Title; PY / PUBYEAR = Publication year; ABS / AB = Abstract; KEY / KW = Keywords.

2.5. Data collection process

One reviewer performed a search for articles with the same criteria on three consecutive days to test the reproducibility of the search terms and a second reviewer checked all processes. The same result was found in all searches. Searches were performed directly in the Web of Science, Scopus, PubMed and SPORTDiscus databases.

2.6. Data items

The main objective of this review was to list the studies that performed a technical-tactical analysis of the grip, that is, that showed in the method section how the athletes performed their grip (hands and/or places of gripping in the *judogi*). However, some studies used these technical-tactical criteria to analyze the videos to generate time-motion information about the combats. Thus, studies that used technical-tactical protocols but performed temporal analyses were included in this review. In addition, as the searches involved terms traditionally used in research in the judo modality to describe the grip (e.g., handgrip; *kumite*) regardless of the objective (technical or physiological), it is likely that all articles indexed in the selected databases with the objective proposed in the present review were found.

2.7. Synthesis methods

The studies were classified into technical-tactical or time-motion analyses; grip or grip attempts; grip locations on *uke's judogi* or hands that performed the grips; and one or two hands holding. For studies that used both methods (technical-tactical and time-motion), they were separated and inserted in the corresponding sections. The results were presented narratively. For the presentation of results and discussion, the articles were separated into three groups: time-motion studies, technical-tactical studies and studies that evaluated the laterality of grips.

3. Results and Discussion

Figure 1 presents a flow diagram of the results of the systematic search conducted, which retrieved a total of 574 articles in the electronic databases Web of Science, Scopus, PubMed and

SPORTDiscus. In the snowballing techniques (Sayers, 2007) two articles relevant to this scoping review were found and taken directly from the websites of the published journals (Ito et al., 2019; Tamura et al., 2012). After removing duplicates, screening the articles by title, abstract and full text, adding relevant studies from other sources 41 studies remained in the present scoping review.

Table 2 presents a summary of the samples, groups, grip configurations and types of analyses conducted in these studies. Of the total number of studies (n = 41), six compared more than one group (Agostinho & Franchini, 2020; Courel-Ibáñez et al., 2014; Miarka, Del Vecchio, et al., 2016; Miarka, Fukuda, Heinisch, et al., 2016; Sterkowicz-Przybycień et al., 2017; Soriano et al., 2019). Table 3 shows the frequency of results between groups of the 41 studies included in the scoping review.

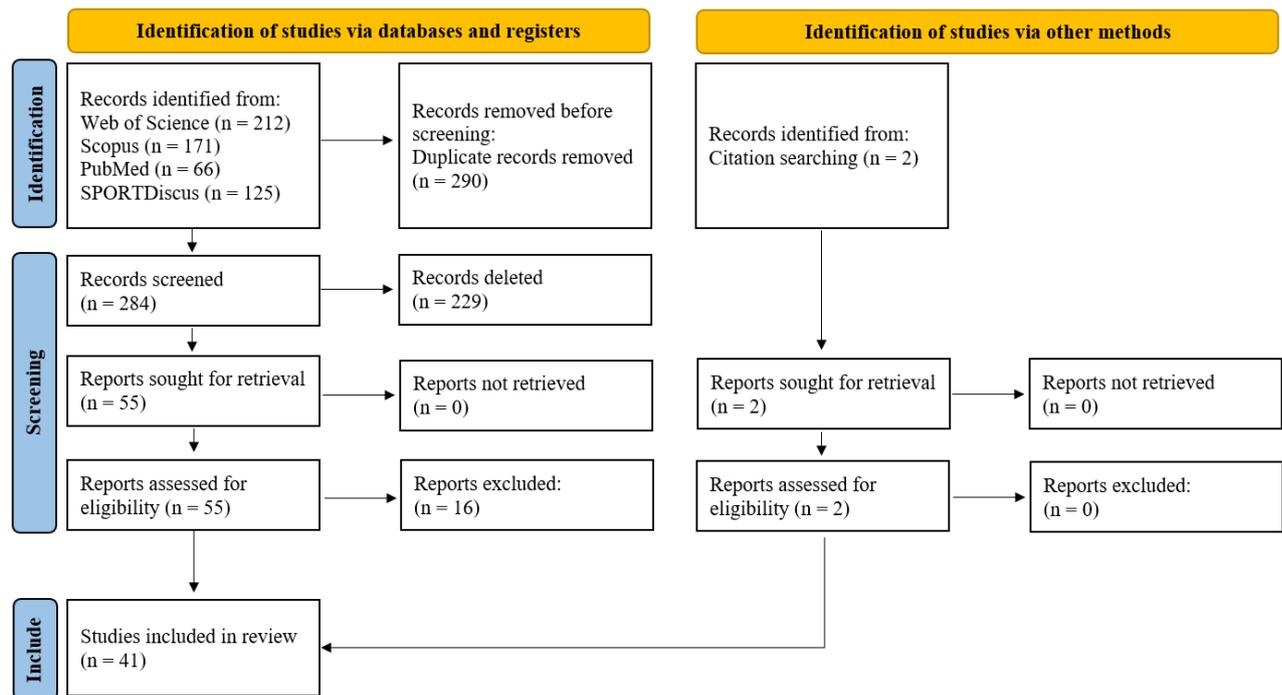


Figure 1. Flow diagram presenting the different phases of the search and study selection. Adapted from Page et al. (2021).

Table 2. Frequency of samples, grips, groups and analyses of studies included in this scoping review.

Sample
Level: regional (n = 2); state (n = 3); national (n = 3); international (n = 24); regional and interregional (n = 1); regional and state (n = 3); state, national and international (n = 1); beginner and expert (n = 1); beginner, intermediate and expert (n = 1); brown and black belts (n = 1); unspecified (n = 1). Age: sub18 (n = 3); sub21 (n = 1); senior (n = 29); sub21 and senior (n = 2); sub18, sub21 and senior (n = 3); sub15, sub18, sub21 and senior (n = 2); unspecified (n = 1). Sex: male (n = 19); female (n = 7); male and female (n = 14); unspecified (n = 1).
Group
Athletes of different experience levels (n = 2), competitive levels (n = 4), final classifications (n = 1), ages (n = 3), sexes (n = 9), weight categories (n = 12), tournament phases (n = 1), home and visiting athletes (n = 1), date of events (n = 4), winners and defeat (n = 3), re-gripping and no re-gripping (n = 1), simulated matches (n = 4), types of grips (n = 1), unspecified (n = 3) were compared.
Grip dispute
Type: grip attempts (n = 3); grip (n = 30); grip attempts and grip (n = 8). Protocol: grip locations (n = 32); grip locations and used hands (n = 7); no specification (n = 2). Used hands: two hands holding (n = 5); one or two hands holding (n = 35); no specification (n = 1).
Analyses
Methods: time-motion (n = 22); technical-tactical (n = 3); time-motion and technical-tactical (n = 16).



Table 3. Frequency of results between groups (n = 49) of the 41 studies included in the scoping review.

Group	Differences between groups		
	Yes	No	Unspecified
Athletes of different experience levels	2		
Competitive levels	2	2	
Final classifications		1	
Ages	3		
Sexes	8	1	
Weight categories	8	4	
Tournament phases		1	
Home and visiting athletes		1	
Date of events	4		
Winners and defeat	2	1	
Re-gripping and no re-gripping	1		
Types of grips	1		
Simulated matches	1	3	
No comparison between groups			3
Total	32	14	3

3.1. Grip time-motion

In this section, articles that emphasized the temporal aspects of judo grip are presented (n = 28). Moreover, relevant information such as sample, types of grips and analysis is shown (Table 4).

The grip dispute is one of the actions with the longest duration in the match (Miarka et al., 2018) and can be divided into two stages: grip attempts and grip (Calmet et al., 2010; Soriano et al., 2019). At this point, the studies must be analyzed carefully because some authors define grip at the moment when both hands hold the *judogi* (Courel-Ibáñez et al., 2014), whereas other studies classify it from the first grab on the *judogi* with just one hand (Calmet et al., 2010). However, most studies (85%) analyzed grips performed with one or both hands (Table 2). A more detailed analysis of the types of grips investigated in these studies is presented in Tables 4, 5 and 6. The grip attempts are movements with contact and without success in the first grab of the *judogi* (Calmet et al., 2010; Soriano et al., 2019).

Table 4 shows the sample, grip dispute, analysis and main outcomes of time-motion studies analyzed included in this scoping review.

Table 4a. Time-motion studies on grip dispute in judo.

Authors	Sample	Grip dispute	Analysis*	Main outcomes#
Calmet et al. (2006)	Regional and Interregional Sub21 and Senior Male and Female	Grip Grab locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences between regional and interregional levels
Marcon et al. (2010)	State Sub21 and Senior Male	Grip One or two hands holding	Time-motion	No differences between the three simulated matches
Miarka et al. (2012)	Regional and state Sub15, Sub18, Sub21 and Senior Male	Grip Grab locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Senior held longer at the <i>judogi</i> (89±63 s) compared to all groups, and Sub15 (72±56 s) longer than Sub18 (50±40 s) and Sub21 (59±51 s)
Ito et al. (2014)	International Senior Male	Grip attempts and grip	Time-motion	The attack efficiency index after grip reconfiguration increased from 1.28 in 2012 to 2.33 in 2013
Miarka et al. (2014)	Regional and state Sub15, Sub18, Sub21 and Senior Female	Grip Grab locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Senior held longer at the <i>judogi</i> (73±57 s) compared to all groups, and Sub15 (57±43 s) longer than Sub18 (45±35 s) and Sub21 (38±30 s)
Challis et al. (2015)	International Senior Female	Grip Types not specified	Time-motion	No differences were found between weight categories

Table 4b. Time-motion studies on grip dispute in judo.

Authors	Sample	Grip dispute	Analysis*	Main outcomes#
Miarka et al. (2015)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	A meantime of 5.81 s (95%CI 5.68 – 5.95 s) for grip time was found
Miarka, Del Vecchio, et al. (2016)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between international and Olympic-level athletes, and between winners and defeat athletes
Miarka, Fukuda, Del Vecchio, et al. (2016)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Winning athletes held more at the left-back and right sleeve (1.5%) than losing athletes (1.2%)
Miarka, Fukuda, Heinisch, et al. (2016)	International Senior Female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Losing (63.5±41.4 s) and winning (62.4±44.8 s) non-Olympic athletes hold less time in <i>judogi</i> than losing (80.2±45.2 s) and winning (84.5±49 s) Olympic athletes; Losing athletes had lower grip frequencies (17.8±0.3) than winning in non-Olympic events (18.6±0.2)
Brito, Miarka, et al. (2017)	International Senior Male and female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between home and visitor athletes
Brito, Moreira, et al. (2017)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Lighter categories showed high grip variability
Dudeniene et al. (2017)	National Sub18, Sub21 and Senior Female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between weight categories
Sterkowicz-Przybycień et al. (2017)	International Senior Male and female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Male athletes in the ≤90/≤100 kg (98.6 s; IQR 66.5 s) categories held longer at the <i>judogi</i> than female ≤70/≤78 kg (63.3 s; IQR 55.8 s) athletes; Lighter athletes held less time at the <i>judogi</i> than heavier athletes
Díaz-de-Durana et al. (2018)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	In relative grip time, heavyweight athletes (8.7±3.7 s) held longer at the <i>judogi</i> than extra-lightweight (6.1±5.1 s), half-middleweight (6.7±3.3 s) and middleweight (5.0±5.0 s) categories; In total grip time extra-lightweight (60.4±52.3 s) athletes held less time at the <i>judogi</i> than lightweight (125.9±95.8 s), half-middleweight (142.2±102.2 s), half-heavyweight (159.9±112.6 s) and heavyweight (165.2±119.6 s)
Franchini, Lira et al. (2018)	State Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between four simulated matches
Julio et al. (2018)	Brown and black belts Male Sub21	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between five simulated matches with different durations
Miarka et al. (2018)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between tournament phases



Table 4c. Time-motion studies on grip dispute in judo.

Authors	Sample	Grip dispute	Analysis*	Main outcomes#
Barreto et al. (2019)	International Senior Male	Grip attempts and grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	In total grip time extra-lightweight (60.4±52.3 s) athletes held less time at the <i>judogi</i> than lightweight (125.9±95.8 s), half-middleweight (142.2±102.2 s), half-heavyweight (159.9±112.6 s) and heavyweight (165.2±119.6 s); Athletes in the lightweight category had a longer attempted grip time (77.3±65.3 s) whereas athletes at the half-middleweight shorter time (14.1±38.6 s)
Dal Bello et al. (2019)	International Senior Male and female	Grip attempts and grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Male athletes used greater variability of grips
Franchini et al. (2019)	State National International Senior Male	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Athletes hold the <i>judogi</i> longer in the initial minutes in simulated combats that occurred after three situations: warm-up or typical judo training or high-intensity interval <i>uchi-komi</i> .
Soriano et al. (2019)	International Senior Male and female	Grip attempts and grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Male athletes invested more time between attempt and grip (14.5±5.6 s) than females (8.4±3.1 s) whereas females (7.3±4.0 s) held longer in a real grip than males (6.1±3.5 s); Heavyweight athletes held longer (17.1±6.5 s) in <i>judogi</i> than lightweight (12.9±3.6 s) and middleweight (13.7±4.6 s) athletes
Agostinho & Franchini (2020)	International Sub18, Sub21 and Senior Male and female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Senior males presented higher grip variation than cadet and junior males and cadet, junior and senior females; No differences were found between gold, silver and bronze medal winners
Kłys et al. (2020)	National Senior Female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Top-ranked athletes hold less time in <i>judogi</i> before performing an attack.
Miarka, Pérez, Aedo-Muñoz, Barreto, et al. (2020)	Regional Sub18 Female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	No differences were found between weight categories
Miarka, Pérez, Aedo-Muñoz, Costa, et al. (2020)	Regional Sub18 Male and female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion	Male athletes invested more time in the grip (58.7±50.3 s) compared to female (38.4±30.4 s) athletes
Soto, Aedo-Muñoz, Brito, Camey, et al. (2020)	International Senior Male	Grip attempts Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Athletes from the heavier categories (≤100 kg and >100 kg) performed fewer grip attempts than athletes from the lighter divisions (≤66 kg and ≤73 kg)
Soto, Aedo-Muñoz, Brito, & Miarka (2020)	International Senior Female	Grip attempts Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Athletes from the >78 kg category performed fewer grip attempts than lighter athletes (≤52 kg and ≤63 kg)

*Time-motion: studies that evaluated grip frequency or time (absolute or relative). Technical-tactical: studies that evaluated hands used in grips and *judogi* grip places. #All results presented with differences between groups were significant with $p \leq 0.05$ or $p \leq 0.01$

In regional and state-level combats, the time per cycle/pause effort for male (Miarka et al., 2012) and female (Miarka et al., 2014) seniors was longer compared to the pre-cadet (sub15), cadet (sub18) and junior (sub21) classes, whereas the grip frequency of the female juniors was lower compared to the female cadets and seniors (Miarka et al., 2014). Although pre-cadet and senior athletes are at different stages of motor development (Goodway & Robinson, 2015), both sexes presented longer and closer absolute grip times to each other compared to the cadet and junior athletes, indicating a non-linear evolution of the time of this action along the competitive ages (Miarka et al., 2012, 2014). However, longitudinal studies concerning the evolution of grip patterns of judo athletes are still lacking, and these investigations could provide relevant information to understand when and how judo athletes develop their grip configurations and strategies.

In 2013, all attacks or blocking with one or two hands below the belt was prohibited (International Judo Federation International Judo Federation, 2013), therefore, Ito et al. (2014) found an increase in the efficiency of attacks between the 2012 Tokyo Grand Slam and 2013 Paris Grand Slam in athletes who held the *judogi* with both hands after performing three grip reconfigurations. In general, the updates to the arbitration rules in 2009, 2010 and 2013 provided a decrease in attacks applied with the hands to the lower limbs (Ito et al., 2013, 2014; Tamura et al., 2012) and an increase with both hands holding the jacket above the belt (Ito et al., 2014, 2015; Tamura et al., 2012).

Miarka et al. (2015) found that the average time for each grip action of male athletes ranked for the 2012 Olympic Games was 5.81 s, close to the values of winners (6.8 s) and losers (6.7 s) male world-class of the half-middleweight category (Miarka, Fukuda, Del Vecchio, et al., 2016). Male, world-class and Olympic athletes, winners and losers, showed no differences in the times and frequencies of grip actions (Miarka, Del Vecchio, et al., 2016; Miarka, Fukuda, Del Vecchio, et al., 2016). On the other hand, Miarka, Fukuda, Heinisch, et al. (2016) found shorter grip times and lower frequencies for the female world-class athletes compared to the Olympic ones and losing athletes had lower grip frequencies than winning in non-Olympic events. Polish higher-ranked female athletes spent less time in grip contact before an attack than lower-ranked athletes (Kłys et al., 2020). Additionally, losing world-class female athletes had lower grip frequencies compared to winning world-class female athletes (Miarka, Fukuda, Heinisch, et al., 2016). Differences between the level of athletes were more evident in females (Miarka, Fukuda, Heinisch, et al., 2016), whereas male athletes presented greater homogeneity concerning the times and frequencies of grips (Miarka et al., 2015; Miarka, Del Vecchio, et al., 2016; Miarka, Fukuda, Del Vecchio, et al., 2016).

When comparing the time differences of the grip action between sexes and weight categories, male athletes, especially heavier ones, hold the *judogi* for longer durations and showed more grip frequency compared to lightweights (Barreto et al., 2019; Brito, Moreira, et al., 2017; Díaz-de-Durana et al., 2018; Miarka, Pérez, Aedo-Muñoz, Costa, et al., 2020; Soriano et al., 2019; Sterkowicz-Przybycień et al., 2017). In simulated matches performed after three training protocols (warm-up or typical judo training or high-intensity interval *uchi-komi*), athletes hold the *judogi* longer in the initial minutes (Franchini et al., 2019). Other studies have found no differences in the frequency of grips of world-class male athletes between the phases of the competitions (Miarka et al., 2018), between female athletes in all weight categories (Challis et al., 2015; Dudeniene et al., 2017; Miarka, Pérez, Aedo-Muñoz, Barreto, et al., 2020), between athletes who compete at home and visitors (Brito, Miarka, et al., 2017), between levels (Calmet, et al., 2006) and between simulated matches (Franchini, Lira, et al., 2018; Julio et al., 2018; Marcon et al., 2010).

World-class male athletes presented high frequencies of grip attempts compared to female athletes (Dal Bello et al., 2019; Soriano et al., 2019). Male and female athletes in the heavyweight category showed a low frequency of grip attempts (Soto, Aedo-Muñoz, Brito, & Miarka, 2020; Soto, Aedo-Muñoz, Brito, Camey, et al., 2020) whereas male athletes of the lightweight category presented a high frequency of grip attempts (Barreto et al., 2019; Brito, Moreira, et al., 2017). No differences were found in the grip attempts between winning and losing world-class male athletes (Miarka, Fukuda, Del Vecchio, et al., 2016).

In general, male athletes showed greater time and grip variability compared to female athletes (Agostinho & Franchini, 2020; Dal Bello et al., 2019; Miarka, Pérez, Aedo-Muñoz, Costa, et al., 2020; Soriano et al., 2019; Sterkowicz-Przybycień et al., 2017). On the other hand, female



athletes held the *judogi* for longer with both hands (Soriano et al., 2019) and showed greater time differences between winner and loser world-class athletes (Miarka, Fukuda, Heinisch, et al., 2016). Considering Cadet, Junior and Senior World Championship medal winners (between 2018 and 2019), Agostinho and Franchini (2020) reported that senior males presented higher grip variation than cadet and junior males and cadet, junior and senior females, but no differences were found between gold, silver and bronze medallists concerning grip variation.

The greater handgrip strength (Kons et al., 2018) and the isometric and dynamic strength-endurance in the chin-up test grip the *judogi* observed in males compared to female judo athletes (Agostinho et al., 2018) can explain the longer times of the grip action of male athletes compared to female athletes during the judo combats (Agostinho et al., 2018; Sterkowicz-Przybycień et al., 2017). Although the lighter athletes have greater relative maximal isometric strength (Franchini, Schwartz, et al., 2018), the heavier athletes are those who hold the *judogi* for longer, probably due to the use of more defensive grips (Barreto et al., 2019; Dal Bello et al., 2019) or because the grip dispute is likely more dependent of strength-endurance than maximal strength (Franchini, Artioli, et al., 2013).

3.3 Types of grips

In this section, the articles that reported how the grips were made with the indication of the places of grips in the *judogi* or which hands executed these grips are presented (n = 7). Due to the duality of methods used and the importance of this section, two studies shown in section 3.1. (Barreto et al., 2019; Miarka, Fukuda, Del Vecchio, et al., 2016) are again discussed.

Table 5 shows the sample, grip dispute, analysis made and main outcomes of studies that analyzed types of grips.

Table 5. Types of grips studies in judo.

Authors	Sample	Grip dispute	Analysis*	Main outcomes#
Calmet et al. (2010)	Beginners, intermediate and experts Senior Male and female	Grip attempts and grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Experts held less time in <i>judogi</i> before attacking (2.7±5.0 s) compared to beginners (11.4±8.9 s)
Miarka et al. (2011)	Regional and state Sub18, Sub21 and Senior Male and female	Grip attempts Grip locations on <i>uke's judogi</i> One or two hands holding	Technical-tactical	Nine grip configurations were identified
Tamura et al. (2012)	International Senior Male	Grip attempts and grip Grip locations on <i>uke's judogi</i> and hands that performed the grips One or two hands holding	Time-motion and Technical-tactical	There was a decrease in leg grip from 32% in 2008 to 22% in 2009
Piras et al. (2014)	Beginners and experts Male and female	Grip attempts Grip locations on <i>uke's judogi</i> One or two hands holding	Technical-tactical	Experts concentrated the visual field for longer in a few fixation points in the central region whereas inexperienced athletes focus more on the distal regions
Miarka et al. (2017)	International Senior Male and female	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and Technical-tactical	Male athletes gripped more frequently with one hand in the opponent's back and sleeve
Ito et al. (2019)	International Senior Male	Grip attempts and grip Grip locations on <i>uke's judogi</i> One or two hands holding	Time-motion and technical-tactical	Attack efficiency after grip reconfiguration and hold on the back (41.5%) increased compared to attacks without grip reconfiguration (31%)
Brito et al. (2020)	Unspecified	Grip Grip locations on <i>uke's judogi</i> One or two hands holding	Technical-tactical	<i>Judogi</i> gripping locations for the right and left sides: collar, sleeve and dorsal

* Time-motion: studies that evaluated grip frequency or time (absolute or relative). Technical-tactical: studies that evaluated hands used in grips and *judogi* grip places. # All results presented with differences between groups were significant with $p \leq 0.05$ or $p \leq 0.01$.

Identifying the types of grips used by athletes helps to understand which are the most efficient technical-tactical during judo fights (Courel-Ibáñez et al., 2014). In simulated combats, Calmet et al. (2010) found that world-class athletes, before making an attack, invested more time in gripping disputes and hold the *judogi* for less time compared to beginners and intermediate *judoka*. Another strategy used by more experienced athletes in grip dispute is to concentrate the visual field for long in a few fixation points (collar and face), whereas inexperienced athletes focus more on the distal regions (sleeves, hands, legs and jacket skirt) (Piras et al., 2014). In general, more experienced athletes execute grip-related movements more cautiously (Calmet et al., 2010) and use peripheral vision to control the opponent's hands during the grip dispute (Piras et al., 2014).

When validating video analysis software, Miarka et al. (2011) proposed twelve grip configurations and found a strong inter-rater correlation for seven grips (left collar, left collar and right sleeve, left collar and right sleeve, right collar, left sleeve, right collar and left sleeve, right sleeve and left sleeve), moderate in one grip (right collar) and weak in one grip (right back and left sleeve). In the intra-rater analysis, they found eight-strong correlations (left collar, right collar, left collar and right sleeve, left-back and right sleeve, right collar, right collar and left sleeve, right back and left sleeve, right sleeve and left sleeve) and a moderate in one grip (left sleeve). For both analyses, three configurations were not observed (right collar and left collar, right collar and right sleeve, left collar and left sleeve).

Tamura et al. (2012) compared the positioning of the *tsurite* (collar hand) and *hikite* (sleeve hand) hands during the attacks carried out between the Paris Tournament 2008 and the Grand Slam of Paris in 2009. For the right-handed athletes, the *tsurite* hand would be the right hand that holds the collar and the *hikite* hand would be the left hand that holds the sleeve. In general, for the *tsurite* hand (right hand for the right-handed and left hand for left-handed) there was a decrease in grip frequency on the back and an increase in the forearm, while for the *hikite* hand (left hand for right-handed and right hand for left-handed) there was an increased frequency holding the collar and arm, and decreased grips in the legs (Tamura et al., 2012). Between 2008 and 2009 only direct hand attacks on the lower limbs were prohibited, but this type of grip was still permitted in counterattacks (Tamura et al., 2012) and attack sequences (Ito et al., 2013).

In an analysis of the grips used by world-class athletes in the male half-middleweight category, Miarka, Fukuda, Del Vecchio, et al. (2016) found that winning athletes used the grip configuration composed by the left dorsal and right sleeve, and only right sleeve more often compared to losing athletes. Miarka et al. (2017) concluded that international male athletes gripped more frequently with one hand in the opponent's back and sleeve compared to females. Barreto et al. (2019) verified that world-class male athletes presented different grip configurations according to weight categories: extra-lightweight athletes held for less time the right collar; half-lightweight athletes showed no differences between grips; lightweight athletes held for longer the left sleeve and right sleeve; half-middleweight athletes held for longer the left collar and right sleeve; middleweight athletes held for longer grabs in the dorsal region; half-heavyweight athletes held for longer the right collar and left sleeve grip; whereas the heavyweight athletes used for longer the left collar and right collar grip.

Besides, Ito et al. (2019) proposed grip actions on the back-number, armhole, belt, shoulder, neck, wrist, skirt (jacket bottom), side, fingers and waist and found that athletes who reconfigured the grip without interrupting the grip dispute, scored more holding the back-number (41.5%), followed by collar and sleeve (32.5%), and other areas (26%). On the other hand, collar and sleeve grips (69.9%), followed by back-number (15%) and in other areas (15%) scored more when there was no grip reconfiguration (Ito et al., 2019). Additionally, Brito et al. (2020) proposed gripping locations on the right and left sides of the collar, sleeve and dorsal.

In general, the most efficient grips were collar and sleeve and grabs in the dorsal region (Ito et al., 2019; Miarka et al., 2017; Miarka, Fukuda, Del Vecchio, et al., 2016). Higher incidence of right-handed athletes was found in the half-middleweight category (Barreto et al., 2019; Miarka, Fukuda, Del Vecchio, et al., 2016), left-handed athletes in the half-heavyweight category (Barreto et al., 2019) and the use of more defensive grips (collar and collar) by heavier athletes (Barreto et al., 2019; Dal Bello et al., 2019). Lighter athletes (Barreto et al., 2019), as well as male athletes, used a greater variety of grips (Dal Bello et al., 2019).



3.4. Grip laterality

In this section, studies that evaluated the laterality between the types of grips as an analysis method are presented (n = 6).

The positions of the lower and upper limbs towards the opponent during the grip action can be defined as *ai-yotsu* (same side) and *kenka-yotsu* (opposite sides). In *ai-yotsu*, athletes execute the grip dispute in the right against the right or left against left positions, with their feet on the same side facing each other. In turn, in *kenka-yotsu* athletes execute the grip dispute in the right against left or vice-versa (Courel-Ibáñez et al., 2014; Ito et al., 2015; Kajmovic et al., 2014; Kajmovic & Radjo, 2014; Stanković et al., 2015, 2019).

To carry out an attack, the athletes develop technical-tactical actions of laterality dominance (Dopico-Calvo et al., 2017; Sterkowicz et al., 2010) and control of the opponent (Ito et al., 2019; Miarka, Fukuda, Del Vecchio, et al., 2016). Therefore, the position that precedes the attack increases the chances of scoring and winning the combat (Courel-Ibáñez et al., 2014). In *kenka-yotsu*, world-class athletes who carried out attacks on the same side of the grip were more effective, whereas in *ai-yotsu* the chances of winning the match increased two times (Courel-Ibáñez et al., 2014).

Additionally, *kenka-yotsu* was the position most used by all sexes and weight categories and athletes who attacked to the same side of the *kumi-kata* increased the chance of scoring (odds ratio: 1.65, $p = 0.009$) and of winning the match (odds ratio: 1.35, $p = 0.018$), regardless of position (Courel-Ibáñez et al., 2014).

Table 6 shows the sample, grip dispute, analysis made and main outcomes of the studies that evaluated the laterality between the types of grips analyzed.

Table 6. Types of grips with laterality studies in judo.

Authors	Sample	Grip dispute	Analysis*	Main outcomes#
Courel-Ibáñez et al. (2014)	International Senior Male and female	Grip Grip locations on <i>uke's judogi</i> and hands that performed the grips Two hands holding	Time-motion and Technical-tactical	<i>Ai-yotsu</i> was the most efficient stance (Odds Ratio = 2.02) and <i>kenka-yotsu</i> the most used (44.9%); No differences were found between sex and weight categories
Kajmovic et al. (2014)	National Sub18 Male and female	Grip Grip locations on <i>uke's judogi</i> and hands that performed the grips Two hands holding	Time-motion and technical-tactical	In throwing techniques females (48.8%) used more the <i>kenka-yotsu</i> compared to males (38.9%)
Kajmovic & Radjo (2014)	State Senior Male and female	Grip Grip locations on <i>uke's judogi</i> and hands that performed the grips Two hands holding	Time-motion and technical-tactical	In throwing techniques females (63.9%) used more the <i>kenka-yotsu</i> compared to males (36.1%)
Ito et al. (2015)	International Senior Male	Grip attempts and grip Grip locations on <i>uke's judogi</i> and hands that performed the grips One or two hands holding	Time-motion and technical-tactical	The attack efficiency after grip reconfiguration in <i>ai-yotsu</i> and <i>kenka-yotsu</i> positions increased from 25.69% in 2012 to 41.27% in 2013
Stanković et al. (2015)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> and hands that performed the grips Two hands holding	Time-motion and technical-tactical	The <i>kenka-yotsu</i> was the most used (37.94%), being more used by the medium (39.81%) and heavy categories (43.72%)
Stanković et al. (2019)	International Senior Male	Grip Grip locations on <i>uke's judogi</i> and hands that performed the grips	Time-motion and technical-tactical	Between 2011 and 2014 there was an increase in <i>ai-yotsu</i> and <i>kenka-yotsu</i> and a decrease in central grip, cross grip and <i>tori</i> grips

* Time-motion: studies that evaluated grip frequency or time (absolute or relative). Technical-tactical: studies that evaluated hands used in grips and *judogi* grip places. # All results presented with differences between groups were significant with $p \leq 0.05$ or $p \leq 0.01$.

The *kenka-yotsu* position was most used in the attack by female athletes of the cadet class in national competitions (Kajmovic et al., 2014) and senior in state championships (Kajmovic & Radjo, 2014), as well as by male athletes participating in the 2011 and 2014 (45.99%) world championships (Stanković et al., 2015, 2019). In contrast, the *ai-yotsu* position was most used by male cadet-athletes in national (49.4%) (Kajmovic et al., 2014) and in-state senior competitions (53.9%) (Kajmovic & Radjo, 2014).

In *ai-yotsu*, male senior class athletes were more efficient using the *ippon-seoi-nage* technique, whereas the female class was more efficient with the *harai-goshi* technique (Kajmovic & Radjo, 2014). In *kenka-yotsu*, both sexes were more efficient using the *uchi-mata* technique (Kajmovic & Radjo, 2014). The *sukui-nage* technique in *ai-yotsu* was the most efficient for national cadet-athletes of both sexes and in *kenka-yotsu* for males, whereas the *o-uchi-gari* technique was more efficient in *kenka-yotsu* for the female group (Kajmovic et al., 2014). It is important to consider that the combats analyzed by Kajmovic et al. (2014) were from the European Judo Championship in 2008 when attacks grabbing the legs were still allowed and the rules grip dispute and penalties were different from the current rules; therefore, caution is needed when interpreting these results.

Ito et al. (2015) compared the 2012 Tokyo Grand Slam and the 2013 Paris Grand Slam and observed an increase of 15.87% ($p = 0.022$) in *ai-yotsu* and 15.22% ($p = 0.033$) in *kenka-yotsu* in attacks by male athletes after grip reconfiguration. Likewise, between the World Championships in Paris in 2011 and Cheliabinsk in 2014, there was an increase in attacks in *ai-yotsu* (3%, $p = 0.006$) and *kenka-yotsu* (8.05%, $p < 0.001$) positions. However, no changes were found in the positions of lighter athletes (≤ 60 kg and ≤ 66 kg) in *ai-yotsu*, and of athletes in the intermediate categories (≤ 73 kg, ≤ 81 kg and ≤ 90 kg) in *kenka-yotsu* between the 2011 Paris World Championships and 2014 Chelyabinsk World Championships (Stanković et al., 2019). Both studies attributed the increase in *ai-yotsu* and *kenka-yotsu* positions to changes in the rules of arbitration, which restricted hand attacks on the lower limbs, thus increasing the grips holding the collar and sleeve during the period analyzed (Ito et al., 2015; Stanković et al., 2019).

According to the findings, the most used position was *kenka-yotsu* (Courel-Ibáñez et al., 2014; Kajmovic et al., 2014; Kajmovic & Radjo, 2014; Stanković et al., 2015, 2019) and the most efficient position was *ai-yotsu* (Courel-Ibáñez et al., 2014). The differences found from the other studies may be related to the level of competition (Kajmovic & Radjo, 2014) and the age of the athletes (Kajmovic et al., 2014). Therefore, studies analyzing matches before 2013 must be interpreted with caution because the grip rules were quite different as thereafter all judo throwing techniques could only be executed when preceded by the grip.

In general, studies on laterality in judo combat were limited to evaluating a few configurations of grips. It was also observed, the lack of identification of right-handed or left-handed athletes. Traditionally, *ai-yotsu* and *kenka-yotsu* positions are characterized by athletes holding the collar and sleeve, but this does not always occur. The grip locations on the *judogi*, as well as the hands that perform these grips, allow for various combinations of grips. Thus, studies that assess the relationship between the lower limbs and greater variability of grips can be carried out.

4. Conclusion

Technical-tactical analyses of judo combats are important to understand which actions are more efficient and at which moments they are most used. The grip dispute and grip configuration are actions that precede the attack and the way they are performed can give the athlete greater dominance and control over the opponent and increase the chance of scoring and winning the match in competition but also improve skills (and self-confidence) succeeding them during training in *randori* (free combat practice similar to official competition combat) or *geiko* (free practice of combat without strength).

The time-motion studies showed mainly the temporal differences in the grip dispute between the sexes, weight categories and competitive level. Male athletes, especially the lighter ones, perform a greater variability of grips compared to female athletes, who in turn, hold the



judogi for longer with both hands. Heavier athletes use more defensive grips and more experience athletes invest more time in the grip dispute. Additionally, technical-tactical studies have shown a higher frequency of grips holding the collar and sleeve, *kenka-yotsu* position, and attacks with both hands holding the jacket above the belt, especially after rules changes.

The technical-tactical and time-motion studies can assist coaches and athletes to organise the effort-pause cycles and absolute time training for grip action according to sex, weight category, age and competitive level. These aspects, together with a tailored analysis of a specific athlete can improve the training effectiveness concerning the grip dispute and grip configuration. Based on these findings, the grip should have priority in training due to its high temporal demand during judo combat. Female athletes, as well as heavier athletes, should be especially focused to increase grip variability. For greater efficiency in the attack, it is recommended the *ai-yotsu* stance and the use of the side of the grip.

Most of the studies used as a reference for the grip the grab locations in *uke's judogi* and did not indicate which hand the *tori* used to perform these grips. In this sense, it is possible to identify combinations of grips such as Collar & Sleeve, Collar & Collar, Sleeve & Sleeve, Dorsal & Sleeve among others, however, as a limitation, it is not possible to identify whether the athlete used the right hand or the left hand in the collar or sleeve. For example, if the grip location on *uke's judogi* is the "left collar", and *tori's* hand that performed this grip is not identified, the grip can be right-handed (traditional) or left-handed (cross) which would directly influence the technical-tactical interpretation of how the grip is performed in judo combat. Likewise, studies that simultaneously analyzed grips with laterality (*ai-yotsu* and *kenka-yotsu*) did not identify these differences (right or left). Only one study looked at *tori's tsurite* and *hikite* hands with grab locations on *uke's judogi*. As a result, there is a limitation in identifying precisely how the grips are performed in judo matches.

More research is needed to understand the efficiency of the grip action in attacks, the types of grips used in offensive and defensive actions, the evolution of grip patterns across ages and the influence of specific rules on their configurations. The main objective of this review was to evaluate time-motion and technical-tactical studies on grip dispute in judo. Thus, in future reviews, articles that assessed the physical capacities, as well as the physiological analyses of the grip action, or reviews considering other languages and with other types of publications, may be included. Searches may also be performed in other databases besides Web of Science, Scopus, PubMed and SPORTDiscus.

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