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The effect of special preventive exercises on the development of some physical abilities of the arms for tennis players for ages (12-14) years

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ABSTRACT

One of the most important duties of sports medicine is to identify conditions that have a negative impact on health and how to avoid them to take advantage of the positive effects of sports , and the role of the doctor or therapist responsible for his team appears in researching and treating various functional, anatomical and pathological developments and changes in the body as a result of playing tennis , and the importance of research lies through the researcher's use of exercises for flexibility and strengthening of the joints and muscles of the arms for the purpose of prevention and reduction of injuries as much as possible, to avoid the player away from training and competitions For long periods of treatment and physical rehabilitation, as the preventive aspect of injuries must occupy a great importance for any person responsible for preparing and training players. The researcher reviewed previous studies and research and found that its focus on injuries to players without focusing on the prevention of injuries, and the study aimed to find out the impact of special preventive exercises in the development of some physical abilities , and the existence of statistically significant differences between the results of the pre- and post-tests in some physical abilities , the research community, represented by the players of the Jadriyah Tennis Academy in Baghdad for the junior category aged (12-14) years, numbering (20) players representing the research community, while the research sample amounted to (12) Players were selected in a deliberate way and they are the most committed players to exercises, (4) players were excluded from them for participating in the exploratory experiment to reach the number of the final sample (8) players from the research community, and the most important conclusions are that the muscle stretching exercises that were used in the research were effective in increasing the strength of the muscles working on the joints, which led to an increase in the strength and speed of muscle contraction. Preventive exercises have positively affected the development of muscle strength and improve the range of motion of the joints of the arms, and the most important recommendations are the need to use special preventive exercises prepared by the researcher to prevent injuries to the arms of tennis players, due to the frequent exposure of these joints to injury and recurrence
The researcher recommended:
1.Continuous development of the effectiveness of performance through training for each player because of its importance in scoring points and achieving victory.
2.Follow up the statistical form by a coach after the match and work to develop the team and players through the results of the form variables.
3.Urging all coaches to follow up the statistical form at each match and know the levels of performance and weaknesses to work on developing them.
4.Activating the statistical form by the Federation through the work of special courses that explain the importance of this form and its effective role in changing the level of basketball sports teams .

1-1 Introduction and importance of the research

Sports medicine is mainly concerned with helping athletes to achieve health and integrated growth and improve their abilities to achieve the highest level of physical performance, by studying the positive and negative effects of physical exercise, training and competition on the body with sports medicine playing its role in prevention, treatment and rehabilitation of athletes , as one of the most important duties of sports medicine is to identify conditions with a negative impact on health and how to avoid them to take advantage of the positive effects of sports , The role of the doctor or therapist responsible for his team appears in researching and treating various functional, anatomical and pathological developments and changes in the body as a result of playing tennis , as the game is characterized by strength and speed in performing movements and skills, in response to the sudden change in different playing modes, which require the player to be highly strong in performing different skills depending on the different playing situations in terms of mobility or hitting the ball strongly to send it to the competitor.

The skill of the front blow is the most important skill that the player relies on to reap the most points, and thus win , and tennis is one of the sports in which the player is exposed to injuries, which is the most important problem facing the players, and because it stands as an obstacle to the development of their levels, so solutions must be found to prevent and reduce their occurrence and that reducing the occurrence of these injuries is important to ensure the continuity of training players and their participation in competitions and achieving results based on the principle (prevention is better than cure).

The importance of the research lies through the researcher's use of exercises for flexibility and strengthening of the joints and muscles of the arms for the purpose of prevention and reduction of injuries as much as possible, to avoid the player away from training and competitions for long periods of treatment and physical rehabilitation, as it is necessary to occupy the preventive aspect of injuries of great importance when any responsible for preparing and training players.

1.2 Research problem

The problem is that some injuries occur as a result of some errors when practicing any sports activity, and injuries and the degree of their seriousness vary from one activity to another, and if we look at tennis, we find that there are many injuries resulting from practicing this type of sports activity.

The game of tennis depends on the movements of the arms in a large way, as well as the legs in moving around the court, which constitutes a great burden on their joints, tendons and muscles, and the specificity of the game and the way it performs, in addition to the lack of balance between strength and flexibility training for the muscles of the arms, as well as weakness in the ligaments, tendons and muscles, so it is prone to many injuries that cause great damage to its ligaments, tendons and muscles.

, that the researcher's review of previous studies and research found that its focus on injuries players without focusing on the prevention of injuries, so the researcher was interested in finding ways and means to help and contribute to the prevention of some injuries to the arms as much as possible, so the researcher prepared preventive exercises that include exercises for joint flexibility and lengthening and strengthening the muscles working on the arms, because of their importance in avoiding injuries during training and competition and reducing them as much as possible, and put in front of workers in this field facts Field exercises enable them to use the preventive exercises provided by the researcher to solve this problem to contribute to reducing it.

1.3 **Research objectives**

1. Preparing preventive exercises, especially in developing strength and flexibility of the arms.
2. The study aimed to find out the effect of special preventive exercises in developing strength and flexibility of the arms.

1.4 Research hypotheses

There are nostatistically significant differences between the results of the pre- and post-tests in some physical abilities.

Search Procedures

2- Research Methodology and Field Procedures

2-1 Research methodology: The researcher using the experimental method designed one group with pre- and post-tests .

2-2 community and sample research: The researcher in determining the research community, represented by the players of the Jadriyah Tennis Academy in Baghdad for the category of juniors **aged (12-14)** years, and

the number of **(20)** players representing the research community, the research sample has reached **(12)** players were selected in a deliberate way and they are the most committed players to exercises, was excluded **(4)** Players from them for their participation in the exploratory experiment to reach the number of the final sample **(8)** players from the research community, and thus the research sample formed **a percentage (40%),** which is an appropriate percentage to represent the research community, while the remaining members of the community were excluded for many reasons, including the lack of commitment of some players to the exercises and the presence of injured players, and this is not compatible with the nature of the preventive exercises used.

2.3 Determination of physical abilities:

After reviewing a group of sources and research specialized in sports medicine, training science, ground tennis and the opinion of the Scientific Committee, the researcher determined the physical capabilities that will be affected by special preventive exercises, represented by strength, and flexibility.

2.4 Tests used in research:

First: Grip strength test[1]:

- Test objective: to measure the strength of the grip muscles.
- Test instruments: dynamometer (kg).
- Test description: The tester holds the device with his fist and the arm does not rest on the body and presses with his fist on the device to try to get the maximum possible force.
- How to register: Each laboratory is given two consecutive attempts and the best result is calculated for it.

- Scoring method**:** The tester's score is the correct number of repetitions within a period of (10) seconds.

Second: Explosive force test of the arms ([2])

- Test name: Throwing a medical ball weighing (2 kg) with hands over the head from a sitting

(1) Ali Salloum Jawad Al-Hakim (2004), tests, **measurement and statistics, the mathematical field**, Baghdad: Al-Latif Press, p. 82.

[2]Suhad Qasim Saeed Ahmed: The Effect of Training with Different Loads in Developing the Level of Some Physical and Skill Volleyball Abilities, Master's Thesis, College of Physical Education for Girls, University of Baghdad, 2002, p. 42.

- Objective of the test: – Measurement of the explosive force of the muscles of the arms.
- Tools: – Flat space area, small rope, chair, medicine ball weighing (2 kg), tape measure.
- How to perform: – The tester sits on the chair holding the medical ball with the hands above the head, provided that the trunk is adjacent to the edge of the chair, and a small rope is placed around the chest so that it is held from behind by a tight way, to prevent the tester from moving forward while throwing the ball with the hands, as the process of throwing the ball is carried out using the hands only (without using the trunk).

Conditions:–

- The laboratory is given three attempts to record the best.
- The laboratory is given an independent attempt at the beginning of the test to train it in performance.
- When the chair vibrates or moves while performing attempts the result is not counted, and gives another attempt instead.

Registration:-

The degree of each attempt is: the distance between the front edge of the chair and the closest point that the ball makes on the ground towards the chair.

The degree of the laboratory is: the degree of the best distance from the three attempts.

Third: Fixed Front Support Test[3]

- Test objective: to measure the stamina of the muscles of the arms.
- Test instruments: electronic clock, whistle.
- Test description: From the front support position, the tester bends the arms and holds the position for as long as possible.
- Recording method: Records the standstill time.

Fourth: The test of raising the arms in front of high from standing[4]**:**

- Test objective: to measure the range of motion of the shoulder joint.

[3]AIBA (2011). Coaches Commission, Evaluation of Boxers' Abilities Coaches Manual, part 3, International Boxing Association, p23.

[4]Maad **Manea Allawi (2008):** The relationship of the range of motion of the joints of the body with some kinematic variables of the path of the gravity bar of the two sides in the snatch lift, (Master's thesis, University of Mosul, College of Physical Education), p. 131.

- Test description: The tester takes a standing position vertically, raising the arms forward, up and back with the torso still standing, extending both the elbow joint and wrist and holding the position for two seconds.
- Shooting is done from both sides.
- Measurement method: The angle formed between the line connecting the upper side at the armpit and the outer line of the arm is measured using the Kenovea program.

Fifth: Test of the extension and bending of the attachment[5]:

- Test objective: to measure the range of motion of the elbow joint.
- Test description: The tester sits on a chair or from a standing position and spreads the arms to the sides and straight, and then bends his arms from the elbows as much as possible and the palms of the hands are inward, the shooting is done from the front
- Measurement method: The angle formed between the line between the head of the ulna and the acuprotrusion of the radius and the line passing through the lateral condyle up the arm in flexion and stretch is measured using the Kenovea program.

Sixth: Wrist joint flexion and extension test[6]:

- Test objective: to measure the range of motion of the wrist joint.
- Test description: The tester takes a standing or sitting position on a chair, bends the wrist joint forward with all the fingers of the hand bent to the maximum possible and fixation for two seconds, then extends the back with the hand joined, imaging from the sides.
- Measurement method: The angle formed between the line between the acronal protrusion of the radius and the head of the second bone of the hand and the line connecting the acuprosthesis of the ulna is measured using the program (kenovea).

2.5 Exploratory Experiment:

For the purpose of obtaining the necessary results and to follow the scientific context of the research procedures, it is necessary to conduct the exploratory experiment because it is "a preliminary experimental study carried out by the researcher on a small sample

Maad[5] Manea Allawi: **Ibid**., p. 131.
Maad[6] **Manea Allawi: ibid., p. 132.**

before carrying out his research with the aim of testing research methods and tools".[7]

- The suitability of the selected tests for the research sample.
- The length of time it takes to take the test.
- Extract the appropriate iterations for each performance intensity that is used.
- The validity of the devices and auxiliary tools used and their suitability for the research sample.
- The readiness of players to carry out the test.
- The efficiency of the assistant team on how to carry out tests and use devices and tools.

The reconnaissance experiment was over two days:

The first day: For tests (strength, range of motion and flexibility tests for the wrist, elbow and shoulder joint), and they were conducted on the members of the exploratory sample, on Saturday (2-11-2024) at ten o'clock in the morning.

The second day: For the exercises, which were conducted on the players of the exploratory sample, on Sunday (3-11-2024) at ten o'clock in the morning.

6.2 Pre-tests:

The pre-tests of the research sample were applied in the outdoor tennis courts at the University of Baghdad - College of Physical Education and Sports Sciences, in the presence of the assistant work team and tools for recording the results, as the researcher conducted the pre-tests on the main research sample for two days, the first day on (6-11-2024) and the second day on (7-11-2024) at ten o'clock in the morning, and it was taken into account to fix the conditions for the test from the place, time, tools, method of implementation and those in charge of it.

7.2 Application of preventive exercises:

By conducting personal interviews with a group of experts and specialists, the researcher prepared the preventive exercises and then supervised their implementation by the assistant team during the training, as follows:..

[7]Academy of the Arabic Language (1984). **Dictionary of Psychology and Education**, 1st Edition, Cairo: General Authority for Princely Printing Affairs, p. 79.

- .The application of exercises (preventive units) continued for a period of two months (eight weeks), starting from Friday (9-11-2024) until (9-1-2025) corresponding to Thursday, and the number of preventive units was (32), at a rate of (4) units per week (Friday, Saturday, Monday, Wednesday).
- The researcher gave four units (general strength) within the main experiment, in order to prepare the sample to meet the requirements of training loads in the main experiment, as one of the laws of muscle strength training is **the third law** (the development of the strength of the main muscles before strengthening the other muscles of the body).[8]
- The total time of the preventive exercises in the main section was approximately (15-30) minutes, during the main experiment.
- The researcher used the method of low-intensity interval training and high-intensity interval training.
- The researcher used the equation (220 - chronological age = maximum pulse) to find out the maximum pulse, in order to use it in the target heartbeat equation for each training unit.
- The intensity used in the exercises is (60% - 85%) for strength exercises, while for flexibility exercises, the intensity is according to the pain limits.
- The preventive exercises used were applied to the research sample in the special preparation period within the main section of the training unit, and according to the sequence of training importance of the basic curriculum.
- The values of training loads were monitored after every two weeks, i.e. after every (8) training units to see the development in the variables studied, and then ration the loads according to this development.

[8]Muhammad Reda Ibrahim Al-Madamagha and Mahdi Kazem Abdul Sudani (2013), **The Foundations of Sports Training for Different Ages**, 1st Edition, Baghdad, Dar Al-Diaa for Printing, p. 203.

2.8 Post-tests:

The post-tests of the research sample were conducted on the two days of the limit, and Monday (12 and 13-1-2025) at ten o'clock in the morning in the outdoor tennis courts at the University of Baghdad - College of Physical Education and Sports Sciences in Baghdad Governorate, in the presence of the researcher, the assistant work team, and the tools for recording the results and under the same conditions as the pre-tests.

3- Presenting, analyzing and discussing the results.

3.1 Presentation of results.

This section deals with the presentation of the results of the tests, analyzing these results and discussing them to find out the most important differences in the research variables of the sample of the study

3.1.1 Presentation of the statistical description of the research variables for the pre- and post-tests of the research sample

Table ()

Shows the statistical description of the research variables for the pre- and post-tests of the research sample.

Post-Test		Pre-test		Unit of measurement	auditions	t
on	Going to	on	Going to			
2.644	28.916	2.918	26.833	kg/force	Left grip force	1
4.123	30.500	4.231	28.083	kg/force	Right grip force	
1.378	8.583	1.381	6.500	Meter and its parts	Explosive power of the arms	2
6.921	31.916	6.035	22.333	second	Fixed Reliance	3
0.514	166.533	0.685	163.333	degree	Left shoulder lift	4
0.834	166.116	0.782	163.208	degree	Right shoulder lift	
0.541	143.291	0.678	138.625	degree	Left elbow bend	5
1.006	142.816	0.712	138.525	degree	Right elbow bend	
0.328	179.733	0.482	178.250	degree	Extension of the left attachment	6
1.946	179.883	0.491	177.675	degree	Extend a right elbow	
0.549	73.383	0.624	68.566	degree	Left wrist flexion	7
0.490	73.691	0.939	69.758	degree	Right wrist flexion	

0.465	72.233	0.435	68.733	degree	Stretch the wrist left	8
0.596	72.416	0.635	68.558	degree	Stretch the right wrist	

4.1.2 Presentation of the results of the research variables in the tests of muscle strength and flexibility before and after the research sample.

Table ()

Shows the unit of measurement, t-value , percentage error and significance for muscle strength and elasticity tests for the research sample

Significance	Sig	Value (T)	Unit of measurement	Tests	t
Moral	0.03	3.837	kg/strength	Left grip force	1
Moral	0.02	4.699	kg/strength	Right grip force	
Moral	0.001	3.91	Meter and its parts	Explosive power of the arms	2
Moral	0.00	5.220	second	Fixed Reliance	3
Moral	0.009	23.588	degree	Left elbow bend	5
Moral	0.008	16.161	degree	Right elbow bend	
Moral	0.002	17.237	degree	Extension of the left attachment	6
Moral	0.004	17.900	degree	Extend a right elbow	
Moral	0.003	30.855	degree	Left wrist flexion	7
Moral	0.005	21.430	degree	Right wrist flexion	
Moral	0.001	22.203	degree	Stretch the wrist left	8
Moral	0.003	20.341	degree	Stretch the right wrist	

3.2 Analysis and discussion of results.

For the purpose of achieving the first hypothesis of the research, which states that "there are statistically significant differences between the results of the pre- and post-tests in some physical abilities, the researcher used the T test) for correlated samples, the results in the table () showed significant differences in

all tests, and from observing the statistical table shows us that the values of the arithmetic means of the post-tests were greater than their values in the pre-tests, which indicates that the results were in favor of the post-test.

The researcher attributes the reason for these differences to the use of special preventive exercises prepared by the researcher, which had an effective impact on the results of the test and the development of the research sample, as the special preventive exercises had a positive impact on the development of muscle strength of the arms, as this development in the muscular strength of the muscles, ligaments and tendons will reflect positively on the prevention of injuries to the arms during training and competition, and this is consistent with (mentioned and Shaghati 2011) in terms of the fact that muscle strength is the main element of Physical fitness and health, which is of great value in the development of sports skills and the most important factors helping to stabilize joints and face emergency situations during movement [9], and confirms Mohamed Sobhy Hassanein (2004) [10], Essam Abdel Khaleq (2005) [11] that muscular strength of the most important physical capabilities that affect the level of performance in sports activities, and is one of the most important elements of sports performance and is the one on which the athlete's access to the highest level depends And that the practice of muscle strength training regularly, varied and gradual in terms of intensity, size and comfort helps to develop the element12 of strength and helps to prevent the occurrence of injuries, and mentions Aboulela (2003): "One of the basic objectives of resistance training is to strengthen the muscles surrounding the joints most exposed to injury, and that one of the changes that occur as a result of resistance training is to increase the strength, tendons and ligaments of the muscle."

[9] Fadel Kamel Mazkour and Amer Fakher Shaghati (2011), **Recent Trends in Endurance Training, Strength, Lengthening**, Calm, Amman: Arab Society for Publishing Library, p. 18.

Mohamed[10] Sobhi Hassanein (2004), **Measurement and Evaluation in Physical Education and Sports**, Part 1, Cairo: Dar Al-Fikr Al-Arabi, p. 217.

Essam[11] El-Din Abdel Khaleq (2005), **Sports Training - Theories and Applications**, 3rd Edition, Cairo: Dar Al-Maaref, p. 85.

([1]) Abu Ela Abdel Fattah (2003): **op. cit**., pp. 231, 237.

As the preventive exercises prepared by the researcher are directed to the most vulnerable areas, as these exercises strengthen the muscles, ligaments and tendons to protect them from injuries.

It shows us from the results of the tests in the table () on flexibility that there are significant differences between the pre- and post-test and in favor of the post-test and attributes the researcher the reason for these differences and development is the effect of preventive exercises prepared by the researcher, whose main goal was to affect the improvement of elastic muscles, tendons and connective tissues surrounding the joint, and the researcher sees the importance of this trait because of its effective role in sports performance, and as a result of flexibility exercises included in the training curriculum, in which the researcher relied on Different types of flexibility The researcher used negative stretching exercises and positive stretching exercises, as well as the use of tools to develop flexibility, and on the other hand, the researcher used dynamic exercises using movement stretching exercises, all of which effectively affected the development of flexibility in the research sample, and the results were consistent with what Al-Dairi (2019) said: Flexibility is one of the most important qualities that an athlete must acquire, because it leads to reducing the possibility of muscle injury and increasing muscle resistance[13].

This is also consistent with Mufti Ibrahim (2001) asserting that "flexibility is essential for mastering physical performance, energy economy, injury reduction and ability to perform at high range of motion[14]".

The importance of flexibility is clearly reflected in the results of the table mentioned through the increase in the flexibility of joints and muscles, as he sees (Hassan 1986) "The effectiveness of the individual in many activities is determined by the degree of flexibility of the overall body or flexibility of a particular joint, especially with high flexibility makes less effort than the person who is less flexible".[15] Performance without interruption and

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Hani Muhammad al-Dairi, **op. cit.**, pp. 127-129.[13]

Mufti[14] Ibrahim Hammad (2001), **Modern Sports Training**, 2nd Edition, Cairo: Dar Al-Fikr Al-Arabi, p. 194.

(3) Amer Rashid Hassan (1986**), Finding Standard Scores for Physical Fitness Tests for Baghdadi School Students aged (17-19) Years in Iraq, (**Master's Thesis, University of Basra, College of Physical Education), p. 43.

develop his abilities and give him self-confidence and outstanding performance.

The researcher believes through the previous results the need to pay attention to this exercise because of its importance for the athlete to face the loads of training and competition and to continue training and not interrupted due to injury, as Osama Riad (2002) confirms "that there is an increase in the percentage of sports injuries with the increase of competition and training and high training loads because they constitute pressure on all vital parts of the body, the most important joints, ligaments, synovial portfolios, muscle tendons and muscles."[16]

The researcher's training curriculum contained multiple flexibility exercises and was used in a scientifically studied manner by distributing them correctly over the application periods, as well as conducting full readiness by preparing the place, tools and full warm-up, which made flexibility exercises effective in increasing strength because the extended or flat muscle can contract with great force and speed, and it is not intended for working muscles only, but for the inhibitor or resistance muscles so as not to work as an obstacle [(17),]

The exercises included in the curriculum gave the research sample a wider range of motion than it was before the implementation of the curriculum and this range helped the research sample to increase the range of motion of the arm, which increased its strength

Through flexibility and stretching exercises, which continued throughout the period of application of the training curriculum on the research sample, the motor performance of the sample became better than in the tribal tests, as "flexibility is determined by the elasticity of the ligaments, tendons and muscles because it allows the implementation of movements with a large range [of motion (18),]

Also, lack of flexibility leads to hindering the demonstration of the level of muscle strength, which in turn leads to a poor level of

Osama Riad (2002), **Sports Medicine and Sports Injuries**, Cairo: Dar Al-Fikr Al-Arabi, p. 120.[16]
([17]Mohammed Hassan Allawi (1994), **The Science of Sports Training**, 13th Edition, Cairo: Dar Al-Maaref, p. 155.
Abdul [18]Jalil Nasser and Muhammad Qusai (2014), **The Effect of Using Three Methods to Develop Resilience for School-Age Boxers (12-14 Years),** Journal of the College of Physical Education, University of Baghdad, vol. 26, second issue, p. 210.

neuromuscular compatibility between muscle fibers, and between muscles with each other, which may lead to muscle injuries ().[19]

Strength training also occurs an increase in the size and strength of tendons and ligaments as a kind of adaptation to protect them from damage as a result of increased tensile strength and this change works to protect ligaments and tendons from tears and allows the muscle to produce stronger muscle contraction ((20().

Through the previous results, the researcher sees the importance of preventive exercises in developing the flexibility and strength of the arms and thus their impact on improving the strength of punches.

4. Conclusions and recommendations

4.1 Conclusions

1. The stretching exercises used in the research were effective in increasing the strength of the muscles working on the joints, which led to an increase in the strength and speed of muscle contraction.
2. The preventive exercises used have an important role in their effect on joint flexibility, which helps in the process of motor transfer and increases the strength of punches.
3. Preventive exercise has a positive impact on the development of muscle strength and the improvement of the range of motion of the joints of the arms.
4. Strength training increases the strength of tendons and ligaments, protecting them from any damage to them.

4.2 Recommendations

1. The need to use special preventive exercises prepared by the researcher to prevent arm injuries to tennis players, due to the frequent exposure of these joints to injury and recurrence.
2. The need to educate trainers and specialists to pay attention to preventive exercises and allocate part of the training unit to these exercises on an ongoing basis to reduce the occurrence of injuries.
3. Conducting similar studies on other age groups.

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[19] Bastawisi Ahmed (2014), **Foundations of Muscular Strength Development**, 1st Edition, Cairo: Modern Book Center for Publishing, p. 93.

[20] Hani Muhammad Al-Dairi: **Ibid**., p. 113.

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Exercises used in research

Strength exercises used in research	
Stand tilting the torso slightly forward, stretch the arms as in the picture with the wearing of weights or carrying dumbbells forearms, raising and lowering the arms alternately and quickly.	1
Front leaning, wrapping a rubber rope behind the back as a resistance, extending and bending the arms.	2
Stand, hold a medicine ball with one hand, escape and catch the ball as fast as possible.	3
Front leaning, pulling and transferring the weight (kettlebell) to the side, and recovering it to the other side with the opposite hand.	4
Standing, holding the rubber cord and arm by placing the bend of the elbow joint, pulling the rope to the front of the body, with the elbow joint fixed on the body.	5
Same as before, pull the arm holding the rope to the side.	6
Hold the tool shown in the picture, in front of the body with the arms bent from the elbow joint, twisting the forearms.	7
Standing, holding a rubber rope attached behind the player, punching with arms.	8

Kneeling, arms bent from the elbow joint back, lifting and lowering the arms holding the rubber cord quickly, with the brachioles fixed.	9
Standing, holding a rubber rope with your hands, bending the arms of the elbow joint and the body, quickly tightening and loosening the rope outward and inward.	10
Front leaning on one arm, touching the signs successively.	11
Kneel, hold the weight (kettle ball) raise and lower the arm holding the weight.	12
Standing, kettle ball, arm at shoulder level, raising and lowering the arm forward and up.	13
Lie down, hold a weight in one arm with the other arm held in a vertical position, lower and raise the weight-bearing arm.	14
Front leaning, move between the rings to the sides as fast as possible.	15
Sitting, holding a bar pole as shown in the picture (flexion and extension of the wrist joint).	16
Same as before, hold the pole from above.	17
Standing, holding a rubber rope in the arms, pulling and loosening the rope to the sides.	18
Flexibility exercises used in research	
Standing, extending arms in front of the body, holding a hand (loop), wrapping the arms to the side and holding fast.	19
Standing, clasping fingers as in the picture, pressing and holding the position.	20
Sit on all fours, place your palms inward and press down.	21
Same as the previous exercise, with the hands rotated outward, and forward.	22
Standing, clasping the arms behind the back as in the picture, pulling the arm and holding alternately.	23
Kneeling, leaning on a fixed stick, with the torso pressed down.	24
Standing, holding the stick as shown in the picture, pulling the stick with the low hand, and steady.	25
Standing, placing a stick between the arms, pushing or pulling one arm to the side.	26
Standing, holding a stick with the arms behind the back, pulling the stick with one arm and holding still.	27

Sit on the knees, support the body as in the picture, with the stick behind the back, press the shoulder down and hold in position.	28
Stand, hold a stick behind the back, pull the stick up and hold still.	29
Stand, hold the stick as pictured, pull the stick with the upper hand.	30