The effectiveness of a recovery program on some biological variables and stress levels for Beginners in gymnastics

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Introduction and Research Problem:

The current era is characterized by the increasing popularity of competitive sports, the rise in the number of global championships held throughout the year, and the growing participation of countries in the Olympic Games cycle. As a result, the level of competitors and sporting achievements has risen, necessitating the adaptation of athletes to this evolving landscape. Consequently, training has been distinguished by the following:

- A sharp increase in training loads.
- An increase in specialization and the volume of specialized training.
- An increase in training for competition. (4:11)

Gymnastics is considered one of the activities that has kept pace with this progress in the modern era due to its elements of excitement and thrill. It has occupied an advanced position among sports competed in at the Olympic, global, international, and local levels. Gymnastics has rapidly evolved since its inception until today in terms of artistic, legal aspects, and it is natural for this progress to require a similar development in scientific planning in the field of sports training.

John Curtis believes that a gymnast needs the ability to exert effort throughout training and have high efficiency in recovery. To maintain the level of performance, the gymnast must continue to perform with the same effort in order to achieve better results. Sustaining effort, whether in training or competitions, requires the gymnast's endurance and ability to recover in order to maintain the required performance and achieve the best results without feeling tired. (18-54)

Modern training is characterized by using various methods to accomplish the training process, which is characterized by a very high level of components such as volume and intensity of the load. This highlights the need for the importance of recovering from physical loads, which represents an important requirement to achieve high levels of performance. By accomplishing recovery processes, the goal of the training process can be achieved. (12:178)

The phenomenon of fatigue is considered one of the physiological processes associated with the recovery process. They are two interrelated processes. Without fatigue occurring, recovery is not required. We must differentiate between fatigue as a desired positive phenomenon that should occur during training and the athlete's exposure to it through regulated training loads, and the state of stress that the player can reach due

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to various factors, including poor training program planning or increased physical and psychological stress resulting from consecutive matches. The phenomenon of stress is considered a negative phenomenon that the player should not reach, and recovery methods play an effective role in achieving that (3:14,15).

Ali Al-Bayek and others (2000) also believe that the pressures resulting from high-intensity heavy loads and an increased number of tournaments during the sports season, along with the psychological reactions and high-concentration physical effort experienced by athletes, pose a real problem for coaches. This has prompted specialists in the sports field to seek the best means to expedite recovery and restore the psychological, mental, and physical balance of players so that they can exert effort and maintain the ability to reach the highest levels (10:13).

The current problem in the research lies in the attempt to reach the gymnast to the highest biological and psychological level that achieves the highest technical level. This is done through proposing a recovery program, highlighting the importance of recovery periods for gymnasts and the need not to neglect them during training and competitions. This prompted the development of our training programs with complementary programs that help increase the ability to recover, thus achieving better physical and skill performance during training and, consequently, in competition. Then, studying the extent of the proposed program's impact on some biological variables and the level of stress among young gymnasts, to add value to the planners and trainers in achieving the best levels.

The importance of research :

- The lack of studies addressing the importance of recovery periods in gymnastics training units.
- The need for the importance of recovery during physical loads, which represents the other aspect of trying to reach high levels.
- The utilization of recovery exercises (physical and psychological) according to the research results in maintaining the physical, training, and technical fitness of gymnasts.

Research Objectives:

1. Designing a rehabilitative training program for Beginners in gymnastics.
2. Investigating the impact of the proposed program on biological variables such as (heart rate, systolic and diastolic blood pressure, maximum oxygen consumption, blood lactate levels, and vital capacity) in the research sample.
3. Examining the effect of the proposed program on stress levels in the research sample .

Hypotheses:

1- There are statistically significant differences between pre- and post-measurements in the biological variables represented by [heart rate, systolic and diastolic blood pressure, maximum oxygen consumption, blood lactate level, vital capacity] in the research sample, in favor of the post-measurement.

2- There are statistically significant differences between pre- and post-

measurements in the level of stress in the research sample, in favor of the post-measurement.

Procedures:

Research method:

The researcher used the experimental method of the current study.

Research sample:

The research sample was selected using the purposive method from the age group (13: 14) years of young gymnasts at Al-Taee Club. The sample consisted of (10 players), with (6) as the main sample and (4) players as a dedicated group for conducting pilot studies.

Reasons for choosing the sample:

- The researcher trained the members of this sample at Al-Taee Club, which facilitated the implementation of the proposed program.
- All members of the sample are at the same stage of development, in which mental and motor maturity are similar.
- The availability of financial and human resources at the club.

Homogeneity of the research sample:

Table (1)

Arithmetic mean, standard deviation and torsion value of the total research n =10 In (age - height - weight - BMI) sample

Variables	Measurement unit	mean	Stdev	skewness
Tall	c-m	132.700	5.788	0.064-
Weight	K-g	29.750	3.433	0.158
Age	Year	13.760	0.250	0.759
Training Age	Year	6.361	6.000	0.961

Table (1) shows the values of the torsion coefficient for the variables (age, height, weight -Training age) are limited to ± 3 , which indicates the homogeneity of the sample members .

Table (2)

The homogeneity of the research sample in biological variables." Level of stress for the basic research sample."

The variables			Measurement unit	mean	Stdev.	skewness
Heart rate		Rest	pulse/minute	73072.	4.809	0.312-
		Effort		195.792	1.021	0.612-
blood pressure	Systolic	Rest	mm/Hg	127.083	7.360	0.170-
		Effort		183.000	9.075	0.331
	extrovert	Rest		86.750	3.542	1.059
		Effort		80.625	3.160	0.356-
Vo2max			l/s	2.392	0.335	0.822
acid level Lactate in the blood		Rest	From/mall	1.415	0.114	0.074-
		Effort		10.975	0.808	0.279-
VC			Liter	3.402	0.529	0.104-
Stress level			degree	42.917	3.694	0.474-

Table(3) shows that torsion coefficients in the biological variables and Level of stress were limited to (± 3), indicating the homogeneity of the research sample .

Tools and means of data collection

1 - Devices and tools:

• Medical scale calibrated to measure weight to the nearest kilogram.

• Rest meter device to measure total body length to the nearest centimeter.

• Mercury sphygmomanometer device with a medical stethoscope to measure blood pressure.

• Polar Tester device to measure heart rate.

• Treadmill device to measure maximum oxygen consumption.

• Accusport device to measure blood lactate acid. • Soft clix lancets used for pricking.

• Medical cotton and disinfectant materials.

2 - Forms:

- Names of the expert gentlemen .
- Personal data registration form, pre and post-tests for the sample.

3 - Tests and measurements used in the research

- **Biological** measurements (heart rate measurement, systolic and diastolic blood pressure measurement, maximum oxygen consumption measurement, blood lactate acid concentration measurement).
- **The level of stress** was measured using the Frank Vital Stress Scale (1971) and its Arabic version was prepared by Mohammed Hassan Alawi and Ahmed Mustafa Al-Sweifi. The scale consists of 15 statements that allow the laboratory to express the level of stress through verbal responses to the scale's statements. This scale is valid for both genders and all ages. Ahmed Al-Sweifi (1982) calculated the reliability of the scale using the reliability of the judges, and the results indicated a reliability rate of 80% and a scale stability of 0.61. The scale includes four response choices for the statements, which are in order (Always - Sometimes - Rarely - Never), and the grades are in the following order (4 - 3 - 2 - 1). Therefore, the highest score for the entire scale is 60 points and the lowest value is 15 points.

5 – Assistants :

Three gymnastics trainers with a Bachelor's degree in Physical Education were selected at Al-Jabalain Club to assist the researcher in implementing and conducting measurements and tests used in the research .

6 - Survey Study :

The researcher conducted a survey study from 5/6/2023 to 8/6/2023 on a sample of four individuals outside the main research sample, representing the research community, with the aim of:

- Determining the time required for the tests.
- Verifying the validity of the devices and tools used in measurement.
- Assessing the readiness of the research sample individuals to undergo the experimental conditions.
- Identifying any obstacles and attempting to overcome them.
- Achieving the best arrangement for conducting the measurements.

Proposed Recovery Program :
Program Foundations:

• Determining the application period of the training program.
• Adapting the program and its contents to the age group of the selected sample.
• Program flexibility and adjustability.
• Recovery is associated with fatigue, thus selecting appropriate recovery methods for each case.
• Identifying and conducting tests and measurements for the variables under research before and after program implementation.
• Emphasizing the spirit of fun and enjoyment within the program.

Use of healing methods: According to the implemented program as follows:

Table (3)
Healing methods used in the program Week Healing methods by time Number of sets Rest between sets Total time

Week	Means of healing over time					number of groups	comfort between groups	total time
	Water exercises	Cold jacuzzi	Hot jacuzzi	Sauna	Steam			
1	m 10	second30	-	-	-	5	second30	m15
2	m 10	30 second	-	-	-	5	second30	m15
3	m 10	second30	second30	-	-	4	-	m15
4	7m	second30	second30	-	-	4	-	m13
5	5m	second30	second 60	120 second	-	3	-	m15.5
6	5m	second30	-	120 second	60 second	3	-	m 15.5
7	4m	second30	second 120	-	60 second	3	-	m 14.5
8	4m	second30	second 120	-	60 second	3	-	m 14.5
9	10m	second30	second 120	120 second	60 second	3	-	m26.5
10	m10	second30	second 120	120 second	60 second	3	-	m26.5
11	10m	second30	120 ث	120 second	60 second	3	-	m26.5
12	m 10	second30	120 ث	120 second	60 second	3	-	m26.5

The proposed training program schedule :

- Program duration: (8) came during the preparation period for competitions and the competition period.
- Number of training units per week: (3) units per week.
- Total training units: (12) training units.

Pre-measurement:

The researcher applied pre-measurements at Al-Tai Club for variables such as age, height, weight, training age, and physiological variables under study, and stress levels from Saturday, 10/6/2023, to Thursday, 12/6/2023.

Implementation of the proposed program:

The researcher implemented the proposed program within the club from 13/6/2023 to 12/8/2023. Post-measurement: After the end of the twelfth week, the researcher conducted post-measurements for the research sample individuals from 14/8/2023 to 15/8/2023 under the same conditions followed in the pre-measurements.

Statistical Processes:

The researcher processed the data statistically using the following statistical analysis methods: Mean - Standard Deviation Stdev.- Median - Skewness - Test (T) - Improvement percentage.

View and discuss the results:

First: Presentation and discussion of the results of the first assignment.

Table (4)

Arithmetic mean, standard deviation, calculated value (t), and ratios of change between the pre and post experimental group in the biological variables under investigation. N = 6

The variables			pre		post		T – Test	Improvement %
			mean	Stdev	mean	Stdev		
Heart rate		Rest	72.037	4.809	69.712	5.985	6.665	2.325
		Effort	195.792	1.021	189.651	1.254	35.456	6.141
Blood Pressure	Systolic	Rest	127.083	7.360	123.025	8.321	1.332	4.058
		Effort	183.000	9.075	176.000	10.035	6.075	7.000
	extrovert	Rest	86.750	3.542	84.621	2.987	1.483	2.129
		Effort	80.625	3.160	73.547	3.954	5.995	7.078
Vo_2max			2.392	0.335	3.508	0.651	15.326	-1.116
acid level Lactate		Rest	1.815	0.114	1.115	0.124	16.391	0.7
		Effort	10.975	0.808	9.894	0.951	14.926	1.081
VC			3.402	0.529	4.389	0.632	12.797	-.987

The value of the table "T" (1.761) at the level of 0.05

It is clear from Table No. (4) that there are statistically significant differences at the level of (0.05) between the means of the two measurements (pre-post) for the experimental group in the level of the variables under study and in favor of the post-measurement. The percentage of improvement between the pre and post measurements was in order (2.325

- 6.141 - 4.058 - 7.000 - 2.129 - 7.078 - -1.116 - 0.7 - 1.081 - -.987) and in favor of the post measurement.

These differences are due to the benefit of the higher mean measurement, which is the post-measurement, as it was higher than the pre-measurement in all indicators of biological variables, and this is an indication of the effectiveness of the proposed hospitalization program.

The researcher attributes this positive effect of the program to regular practice of the program units, as the program led to improving the biological variables under research.

It is clear from Table (4) that there are statistically significant differences between the pre and post measurements of the experimental group in measuring heart rate and measuring systolic and diastolic blood pressure at rest and immediately after exertion in favor of the post measurement.

It is scientifically known that the heart rate is lower in an athlete than in a non-athlete, because the heart muscle adapts to high-intensity physical effort, as muscle work increases, which requires more nutritional components that the muscles need, which they derive from the amount of blood pushed to them, which in turn requires greater work. The heart muscle results in an increase in the size of the heart muscle and an increase in the rate of blood flow. In addition, regular training leads to an economy in the work of the heart as a result of the heart adapting and increasing its size. The adaptation of the athlete's heart is due to an increase in the amount of blood that the heart pumps per minute by a greater percentage than relying on increasing Heart rate.

his is consistent with what Abu El-Ela Abdel-Fattah (1999) indicated that the number of heartbeats per minute at rest decreases with sports activity and that pulmonary ventilation increases significantly during intense sports training at a rate greater than taking oxygen until it eventually reaches a state in which it is impossible to That the oxygen intake increases even more.(4:169)

Muhammad Nasr al-Din Radwan (1985 AD) (15) states that sports training leads to physiological responses, including a decrease in blood pressure, and the researcher believes that the improvement in biological variables as a result of training and adaptation may be an indicator of an increase in the level of the player's training status within certain limits, as the player regains the stable level. For his systolic blood pressure, which is an indicator of the speed of the recovery process, as the needs of the muscles and peripheral tissues decreased... for more blood flow necessary to remove energy waste, in addition to the decrease in the magnitude of the cardiac impulse at rest, which leads to a decrease in systolic blood pressure. Karpovich and Sinning have indicated Karpovich & Sinning (1971) found that the resting blood pressure rate was lower in a trained individual than in an untrained individual. (21:91)

It is also clear from Table (4) that there are statistically significant differences between the pre- and post-

measurements in measuring the maximum oxygen consumption (Vo2Max), the amount of energy consumed during exercise (METs), and the cardiac impulse of blood in favor of the post-measurement, where the percentage of improvement reached 1.116.

The researcher attributes these differences to the fact that the maximum oxygen consumption refers to the amount of oxygen that an individual can use to produce energy when he works to the maximum of his ability. Imad Al-Din Shaaban (2016 AD) states that the maximum oxygen consumption expresses the body's aerobic capacity, and three basic organs carry out this responsibility. The body is the respiratory system, the circulatory system, and the muscular system, so the muscles are considered the determining factor for aerobic efficiency and not the process of transferring oxygen to the muscles. Accordingly, developing muscle endurance is an important requirement, and the aerobic endurance of muscle fibers depends on their ability to consume oxygen, and this depends primarily. It increases the muscle fiber's content of hemoglobin, mitochondria, aerobic energy enzymes, and increases blood capillaries. These physiological changes are responsible for increasing the muscle's efficiency in consuming oxygen and producing aerobic energy, and this helps the muscle to work for a long time and withstand fatigue.

The researcher adds that because the hospital program has a very important effect in replenishing energy stores in the muscles and blood, which has a positive impact on the members of the research sample, such that training begins each time from a better level than the previous level, and this in turn helped raise the gymnast's performance level and thus the maximum oxygen consumption.

The researcher believes that these differences and the rates of change (improvement) that occur are due to the functions of the respiratory system improving as a result of training, which leads to an increase in its efficiency. It then adapts to the types of physical effort that the individual athlete receives, and signs of adaptation appear with changes in the size and capacity of the lung as a result of training, so vital capacity increases, which means the amount of air. Which can be exhaled after maximum inhalation and the amount of remaining air increases.

Thus, the first hypothesis is fulfilled, which states: There are statistically significant differences between the pre- and post-measurements in the biological variables represented by [heart rate, systolic and diastolic blood pressure, maximum oxygen consumption, lactic acid level in the blood, vital capacity] among the research sample and in favor of the post-measurement. .

Second : Presentation and discussion of the results of the Second assignment.

Table No. (5)
The significance of the differences between the means of the two measurements (pre-post) and the percentage of improvement in the level of stress n=6

variables	Unit of Measure	pre		post		T – Test	Improvement%
		mean	Stdev	mean	Stdev		
Stress Level	Degree	43.962	4.202	25.524	2.321	.86061	18.438

The t-value of the table (1.761) is at the level of 0.05

Table (5) shows statistically It is clear from Table No. (5) that there are statistically significant differences at the level (0.05) between the averages of the two measurements (pre-post) for the experimental group in the level of stress and in favor of the post-measurement. It is also clear from Table No. (5) that there is a percentage of improvement in the post-pretest measurement. The indicators of the level of stress reached (18.438), and these differences are due to the benefit of the higher measurement, which is the posttest, in the level of stress in B, and this is an indication of the effectiveness of the proposed hospitalization program in reducing the level of stress.

The researcher attributes these differences and percentages of change in the experimental group to the proposed recovery program (recreational games in the water - sauna - jacuzzi - steam), thus increasing the intensity and size of the training loads, in addition to the muscle and mental relaxation program that was applied to the experimental group.

These results are consistent with what Imad Al-Din Shaaban Ali (2016) (11) indicated that recovery exercises have a positive effect on improving the level of the ability to relax, which helps with humanity and ease in skill performance.

These results are also consistent with what Ibrahim Mahmoud Diab (2018) (1) explained that water exercises lead to reducing the effect of the stress response and helping to reach the optimal level of stress, and preventing the accumulation of stress by working to reach a low level of stress. Basal, reaching a degree of deep relaxation at which the level of stress is lower than the basal level.

John Curitis (1994) emphasizes that performance on an organized basis depends on the player being above the level of arousal, so reaching the optimal level of stress is of prominent importance in raising the level of performance. In addition, recovery helps to increase concentration and get rid of stress. Developing and activating the powers of mental perception, as well as increasing the ability to work for long periods, in addition to many physical, psychological and physiological benefits that can be achieved from developing the ability to relax.(18:45)

Thus, the second hypothesis is fulfilled, which states that there are statistically significant differences between the pre- and post-

measurements in the level of the degree of stress among the research sample, in favor of the post-measurement.

Conclusions and recommendations

First: Conclusions

In light of the research procedures and results, the researcher reached the following conclusions:

1. There was an improvement and positive change in biological variables ([heart rate, systolic and diastolic blood pressure, maximum oxygen consumption, lactic acid level in the blood, vital capacity] in the research sample and in favor of the post-measurement.
2. There are statistically significant differences between the pre- and post-measurements in the level of stress level among the research sample, in favor of the post-measurement.

Second: Recommendations

In light of the research results and conclusions, the researcher recommends the following:

1. The importance of coaches implementing various recovery programs and integrating them with physical and skill training programs for Gymnastics players.
2. Paying attention to using recreational exercises and games in the water in order to increase concentration in artistic performance and reduce tension and anxiety.
3. The necessity of providing the necessary capabilities to fully implement hospital training methods.
4. Conduct similar research on other different sports and on different samples to confirm the effectiveness of the importance of recovery, and document the results of this research.

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