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The Role of a Rehabilitation Program in Some Biological Compounds for Patients with Low Back Pain for Female Athletes in Baghdad Clubs

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ABSTRACT

Lower back pain is one of the common injuries among athletes in various sports, ages and type of competition, it is common to occur during both training and competition, and affects their performance and abilities and hinders their progress in their training curricula and competitive plans, and sports injuries in general are a nightmare that haunts the dreams of players and coaches. The research aims to identify the effect of rehabilitation programs on relieving low back pain for female athletes, the researcher relied on data collected from scientific tests to measure muscle strength, low back pain and measure the level of Some biological compounds such as endorphins and encaphalines, which are biological compounds that have analgesic properties for a sample of (8) female athletes distributed over three sports, namely volleyball, handball, and athletics, the results indicated the positive effect of the rehabilitation programs that the athletes underwent in improving muscle strength and reducing the level of pain in the early stages of rehabilitation.

1- Introduction and the importance of the research

1.1 Introduction:

Athletes suffer from almost regular exposure to sports injuries and in fields and mathematics, one of which cannot be excluded, and one of the chronic injuries that hardly leaves athletes in general and women in particular is low back pain as a result of friction and difficulty in performance and intensive training, as this poses a real threat to the athlete's career and constitutes an obstacle to the development of athletic performance. Lower back pain is the most prominent of these injuries that athletes and those in charge of the training process are afraid of due to their immediate and direct damage to the athlete's body, which makes him unable to perform and train, which leads to a significant decline in performance.[1]

One of the biological compounds is endorphins, a hormone made up of a peptide chain, a substance found in the nervous system of humans and animals.[2] Endorphins and some similar or close chemicals called insphalins are part of a wide range of morphine-like compounds called opioids, which help relieve pain and give a feeling of relief and improvement.[3] Scientists believe that endorphins control the brain's ability to receive, respond and feel pain or stress, and can form part of the body's pain relief system[4]. Enkevalinate, a pentapeptide, is involved in regulating the body's sense of pain through its effect on raising the threshold level of pain and relieving it.[5]

2.1 Research Problem

Low back pain is a very common injury among athletes in general and female athletes in particular, as it significantly affects their athletic performance and their ability to continue training and compete. These pains are often caused by muscle strain, overloading, incorrect postures of the body during performance, injuries resulting from repetitive movements that place their burdens on the lumbar area, which strain the muscles of the lower back and make them susceptible to injury, leading to muscle weakness, contractions in the tissues, ligaments and fascia surrounding the muscle groups, and negative effects on the skeleton and joints. Despite the availability and variety of rehabilitation programs aimed at treating lower back pain and reducing pain, there is a lack of studies on the effect of endorphins and enkephalins, internal analgesic peptides that contribute to the relief of low back pain in those affected. It is considered an opioid peptide that plays an important role in regulating pain within the body, but its effect on lower back injuries has not been adequately studied in women's sports where muscle strain is high and injury susceptibility is common.

The research problem is to shed light on the role of endorphins and encaphalins in reducing low back pain, and to analyze the effectiveness of different rehabilitation programs in improving muscle strength and relieving pain associated with lower back injury. This requires studying the levels of endorphins and encaphalins before and after the application of sports rehabilitation

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[1] - Salahuddin Mohamed Mohamed, Mona Mahmoud, Arabi, & Sara Ahmed Mahmoud. (2025). The Effect of a Rehabilitation Program Using Some Neuromuscular Sensory Receptor Facilitation Methods and Air Cup Massage on Lower Back Pain in Women from 40:50 Years Old. *Journal of Physical Education and Sport Sciences Research*, *5*(2), 48-70.

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[3] Abdelmajeed Ghorab, & Ahmed Helmy. (2025). The Effect of Recreational Activities on Positive Thinking and its Reflection on Sport Performance in Some Athletes. *Journal of Theories and Applications of Physical Education and Sport Sciences*.

[4] Al-Ajrab, Samah Sami, Orabi, S., Samira Mohammad, A. R., & Hussein. (2015). The Effect of Rhythmic Aerobic Exercise Program on Depression and Blood Endorphins in a Group of Depressed Women in Jordan. *Dirasat: Human & Social Sciences*, *42*.

[5] Mahmoud Abdelghani Khalifa, & Abdulghani. (2025). The Effect of Excessive Gluten Intake on Weight Gain and Obesity. *Journal of Specific Education Research*, *2025*(92), 1059-1068.

programs, and testing the effect of these biological compounds on the level of pain and physical performance of athletes.

3-1 Research Objectives:

1. To identify the impact of sports rehabilitation programs in reducing low back pain for female athletes.
2. Learn about the relationship between endorphin levels and low back pain for female athletes.
3. To learn about the relationship between incephalin levels and low back pain in female athletes.

4-1 Research Hypotheses:

1- There is a significant correlation between sports rehabilitation programs and the reduction of low back pain for female athletes.
2- Higher levels of endorphins in the blood after rehabilitation programs are associated with a reduction in lower back pain for female athletes.
3- Higher levels of enkephalin in the blood after rehabilitation programs are associated with a reduction in lower back pain for female athletes.
4- Sports rehabilitation programs contribute to raising the level of muscular strength of the lower back muscles of female athletes.

5-1 Research Areas:

5.1.1 Human Field: They are the players of Baghdad clubs in handball, volleyball and athletics for the 2023-2024 sports season and the 2024-2025 sports season.

5-1-2 Temporal Domain: The period from 2/4/2023 to 18/5/2025.

5.1.3 Spatial Domain: Physiotherapy Centers in Baghdad.

2- Research Methodology and Field Procedures

2-1 Research Methodology:

The nature of the problem determines the nature of the method, so the researcher used the experimental method, which is "the closest and most honest to solving several scientific problems practically and theoretically". [6]

2-2 Research Population and Sample:

In the study of this research, the researcher used an experimental method to identify the effect of sports rehabilitation programs on low back pain for female athletes by evaluating the levels of endorphins and encaphalins in the blood, the levels of muscle strength of the lower back muscles, and the level of pain before and after the implementation of rehabilitation programs for female handball, volleyball, and athletics players. Eight players with lower back pain were selected. Special criteria were set for sample selection, which included that participants had chronic low back pain diagnosed by a specialist physician.

The levels of endorphins and encaphalins in the blood of all affected players were then measured using laboratory blood tests, in addition to assessing the levels of muscle strength of the lower back muscles using a dynamometer and determining the level of pain using a pain scale.

An athletic rehabilitation program developed by the researcher designed for athletes suffering from lower back pain, as it includes strengthening exercises for the muscle groups in the lower back, relaxation exercises, and rehabilitation using physical therapy techniques. After completing the physiotherapy program during the rehabilitation period, the levels of endorphins and encaphalins in the blood, the level of strength of the back muscles were re-measured, and pain was assessed using the same tools that had been used in the initial phase. The researcher then used statistical analysis to compare the pre- and post-measurements to find out the effect of the

6_ Mohamed Hassan Allawi, Osama Kamel Rateb Scientific Research in Physical Education and Psychology Cairo, Dar Afkar Al-Arabi, 1999, p. 217.

rehabilitation program on low back pain, endorphins and encaphalin levels, and muscle strength levels.

2-3 Research Sample:

The research sample included female athletes with lower back pain who ranged in age from 18 to 30 years, which is the age group that has good recovery ability and high muscle strength, making them suitable for the research subject.

Table (1) Measurements Adopted in the Research

Measurement times	Method used	Purpose of measurement	Variable	Measurement Type
Before and After the Program	Blood test using ELISA technology	Measuring the level of endorphins	The level of endorphins in the blood	Biochemist
Before and After the Program	Blood test using ELISA technology	Measuring the level of incavaline	Blood level of enkephalin	Biochemist
Before and After the Program	VAS Scale	Pain Level Assessment	Pain intensity	Clinical Career
Before and After the Program	Arrival from Sitting	Back muscle flexibility	Lower back elasticity	Functional motor
Before and After the Program	Dynamometer	Strength of the back muscles	Muscular strength	Muscular function
Before and After the Program	Balance Test	Balance after rehabilitation	Dynamic Balance	Functional Balance

Table (2) Homogeneity of the research sample members with morphological traits

Variance Coefficient %	Standard deviation	Arithmetic mean	Variable
1.27	2.56	172.2	Length (cm)
6.08	4.67	66.3	Weight(kg)
6.77	1.54	24.6	Age (year)
26.22	1.57	7.0	Training Age (1 Year)

2.4 Measurements and tests used in the research

Table (3) shows the levels of endorphins and encaphalins, pain intensity, lower back flexibility, back muscle strength, and balance

Balance Test	Lower Back Strength	Lower Back Flexibility	Pain intensity 1-10	Level of Inquiphalins	Endorphins level	Player
70	90	15	7	111	123	1
68	85	14	6	107	131	2
69	92	12	8	117	112	3
70	88	13	7	114	126	4
68	86	14	6	110	111	5
65	91	13	7	112	128	6
69	88	14	7	108	130	7
67	91	15	7	117	112	8
68.25	88.87	13.75	6.87	112.00	121.62	Arithmetic mean

1.11	2.06	6.02	3.12	4.05	6.09	Standard deviation

2.5 Exploratory Experiment:

The researcher conducted a preliminary reconnaissance experiment on a sample of two injured players outside the main sample, at the Physical Therapy Center in Baghdad, with the aim of identifying the suitability of the tests, devices, and tools used, in addition to determining the time required to apply each test and evaluating the extent of the sample's cooperation with the researcher.

The objectives of the exploratory experiment were as follows:

Validation of the instruments and instruments used in the measurements (e.g. dynamometer, blood sample sampling instruments, VAS meter...), and ensure that the instructions for the exams are clear for all participants. Calculate the total time required to perform the tests for the entire sample. Identify any difficulties or procedural errors that may arise during the implementation of the tests. Ensure the efficiency of the assistant team in executing tests and recording data. The exploratory experiment was carried out five days before the start of the basic tests, and after analyzing its results, the researcher made the necessary adjustments in the order of some tests to ensure the smooth flow of work and reduce the effort on the sample members. The tools were also approved in their final form after ensuring their accuracy and ease of use.

2.6 Qualifying Program:

A specialized rehabilitation program has been prepared by the researcher to treat low back pain for female athletes with low back pain through a set of therapeutic and physical exercises designed according to scientific foundations, taking into account the physiological and neurological aspects affecting the levels of natural incephalin.The training program aims to strengthen the muscles of the lower back and abdominal muscles to improve muscle balance, as well as to improve the flexibility of the spine and the tissues surrounding the lumbar girdle, reduce the mechanical stress on the lumbar vertebrae as a result of performance, stimulate the nervous system to release endorphins and encaphalins as natural pain relievers, improve neuromuscular balance and reduce the chances of relapse. The duration of the rehabilitation program was (3-8) sessions per week × 60 minutes per session.

2.7 Dimensional Measurements:

The researcher conducted the dimensional measurements on the research sample in the same way as the previous measurements and after applying the qualifying program to the research sample.

2.8 Statistical Methods:

The researcher used the statistical package (SPSS V.26) to process the data statistically.

3. Presentation and discussion of the results

3.1 Presentation and analysis of the results:

Significance Level	Calculated value (t)	Dimensional Standard Deviation	Dimensional arithmetic mean	Tribal Standard Deviation	Tribal arithmetic medium	Unit of Measurement	Testing
0.009	2.02	4.23	130.11	6.09	121.62	nmol/L	Endorphins level
0.005	1.05	4.18	137.08	4.05	112.00	pg/mL	Level of Inquiphalins
0.001	8.65	0.84	2.8	3.12	6.87	Degree	Pain intensity

0.001	11.71	1.41	17.33	6.02	13.75	Poison	Lower Back Flexibility
0.001	16.78	1.92	94.8	2.06	88.87	Second	Strength Lower Back
0.002	8.11	4.22	17.23	1.06	13	Poison	Balance Test

3.2 Discussion of the Results:

The results showed an increase in the level of endorphin secretion from an average of 6.87 nmol/L before the program to 2.8 nmol/L after the program, which is a statistically significant difference (t-value) of 2.02, and a significance level of 0.009. This significant increase reflects the effectiveness of the rehabilitation program used to increase the secretion of this biological substance. The results also showed an increase in the level of enkephalin secretion from an average of 112.00 pg/mL before the program to 137.08 pg/mL after the program, which is a statistically significant difference of 1.05 t), and a significance level of 0.005. This increase reflects the effectiveness of the rehabilitation program used to increase the secretion of encaphalins, which contribute significantly to pain relief in those affected. Enkephalin is one of the endogenous opioid peptides in the human body that binds to pain receptors and reduces the Its signals to the brain during the injury period, and its increased level is a physiological indicator of improving the neurological response to pain and reducing its intensity. Scientific studies and research have shown that regular moderate exercise increases the concentration of opioid peptides in the blood.[7] This is consistent with a study (Tobaldini, 2019) whose results showed an increase in enkephalin and endorphin levels after aerobic and resistance training sessions.[8]

Scientific studies and research have confirmed that physical therapy and rehabilitation programs that combine strengthening exercises and functional stretching contribute to reducing chronic pain in the lower back, a study (McPherson, 2022) showed that structured motor interventions reduce pain markers in the lower spine.[9]

In the lower back flexibility tests, the flexibility ratio increased from 13.75 cm to 17.33 cm after the implementation of the curriculum, which is a statistically significant difference of 11.71 t, and a significance level of 0.001. The significant improvement in the level of flexibility is due to the introduction of dynamic and fixed stretching exercises within the program, which increased the range of motion of the lumbar vertebrae, pelvic girdle in general, and the muscles of the lower back, and this is in line with what was stated in a study (Haidar, 2018). This indicates that stretching and rehabilitation exercises of the lumbar area lead to a significant improvement in flexibility and reduce muscle stiffness in the lumbar region.[10]

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[9] McPherson, K. B., & Ingram, S. L. (2022). Cellular and circuit diversity determines the impact of endogenous opioids in the descending pain modulatory pathway. *Frontiers in Systems Neuroscience*, *16*, 963812.

[10] Haidar Sharif. (2018). Indicators of improvement of low back pain in women as a result of exercise in Swiss ball. *Scientific Journal of Physical Education and Sport Sciences. Helwan University*, *84*(September Part 2), 176-188.

The level of lower back muscle strength improved from 88.87 seconds to 94.8 seconds in the fixed endurance test, which is a statistically significant difference of 16.78 t(16), and a significance level of 0.001. This development in muscular endurance means that the rehabilitation program prepared by the researcher has enhanced the muscular capacity and endurance of the core back muscles, which enhances the support of the spine and supports its mobility in sports and daily life activities. The results of the current study are consistent with the results of (Hanafi, 2019) which confirmed Strengthening the muscles around the trunk helps reduce muscle strain, reduces pressure on the intervertebral discs in the lower back and reduces the chances of re-injury.[11]

4. Conclusions and recommendations

4.1 Conclusions

1. A clear and statistically significant reduction in pain intensity among the sample members, indicating the effectiveness of the rehabilitation program in relieving pain caused by repetitive mechanical pressure.
2. Significant improvement in lumbar flexibility, reflecting the role of dynamic and static stretching exercises in increasing the range of motion of the lumbar vertebrae.
3. A marked increase in muscular endurance, which shows that the strengthening exercises used helped to enhance the muscular strength supporting the spine.
4. Increased endorphin level after the rehabilitation program, which is an important biological indicator of improved neurological response and reduced pain feeling.
5. Increased level of enkephalin after the program, which is an indication of improved neurological response and reduced pain feeling.

5.2 Recommendations:

1. Adopting the rehabilitation program applied in the current study with female athletes suffering from mechanical injuries in the lower back area.
2. Physiological indicators such as endorphin and enkephalin levels should be monitored as part of the medical evaluation of the health condition.
3. Using preventive exercises within the training units for female players as a preventive plan to avoid injuries and to reduce the risk of lower back injury.

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