

Postural deviations among bodybuilders and their training causes

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Received: 16/07/2024

Accepted: 30/09/2024

Published: 12/10/2024

Abstract:

This study aims to identify common posture deviations among bodybuilding practitioners in the state of Tebessa. The researcher employed a descriptive analytical method, selecting a purposive sample of 51 individuals and an additional 5 individuals for an exploratory sample from the bodybuilding community, totalling 270 athletes. APECS was used to measure posture deviations, complemented by a questionnaire to determine their causes.

Among the sample, the most prevalent posture deviations included shoulder droop (31.37%), head tilt (27.45%), knee misalignment (9.8%), and forward head posture (7.84%). The researcher attributed these deviations to training programs lacking scientific foundations and principles. Moreover, the absence of competent coaching in technical aspects, load management, nutrition, and recovery were identified as significant contributing factors.

Keywords: bodybuilding; coach; physique; posture deviations.

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I- Introduction

The importance of sports in maintaining public health and physical safety is evident, with a particular emphasis on fostering a healthy, balanced generation. This contributes to societal well-being by promoting a healthy physique and preventing various health, social, and psychological issues.

Among sports, bodybuilding stands out for its focus on sculpting the body to achieve perfection and balance, thereby enhancing self-confidence. It has gained popularity among young people, teenagers, and women due to its ability to achieve physical and aesthetic goals. Bodybuilding involves strengthening muscles and improving their coordination through various physical training methods (Ismail, 2021).

However, despite its noble goals, bodybuilding is associated with significant health challenges, such as posture deviations and injuries to bones and muscles. These issues contradict the sport's core principles of bodybuilding and bodily balance, often resulting from training errors in technique and planning. This underscores the critical role of coaches, who are essential not only as guides but as the primary element in ensuring the sport's goals are achieved correctly and safely. They are responsible for planning and adjusting training loads and programs to meet individual needs, physical abilities, and future objectives.

The widespread occurrence of posture deviations among athletes, particularly in gym settings, warrants attention and further research. This is especially important given advancements in sports medicine, anatomy, biomechanics, and sports rehabilitation. These deviations often stem from inadequate adherence to fundamental training principles regarding intensity, volume, and technique, highlighting the importance of experienced and qualified trainers (Salerno, 2009).

Jassim Muhammad argues that the increasing number of bodybuilding enthusiasts, particularly young men, who rush to achieve muscular bodies without considering proper training methods, poses risks. Many ignore coaches' advice on correct exercise techniques, rush into lifting heavy weights, experience exercise-related stress, and neglect adequate rest, leading to adverse effects (Jassem, 2015).

Despite its numerous benefits, bodybuilding also carries significant risks and drawbacks, notably injuries and posture deviations prevalent in bodybuilding facilities. Extensive research, both domestic and international, has explored these issues, prompting our study aimed at uncovering the underlying factors. Consequently, the following questions guided our study:

1. Study Questions:

- 1) What is the nature of these deviations occurring among bodybuilding practitioners?
- 2) Does the absence of a scientifically based training program contribute to the appearance of postural deviations in bodybuilders?
- 3) Does the absence of a competent trainer contribute to postural deviations in bodybuilders?

2. Study Hypotheses:

- 1) Bodybuilding athletes exhibit various postural deviations in the upper and lower parts of the front and side.
- 2) The lack of a scientifically based training program leads to postural deviations among bodybuilders.
- 3) The absence of a competent trainer leads to postural deviations among bodybuilders.

3. Objectives of the Study:

- 1) This study aims to identify common posture deviations among bodybuilding practitioners within the research sample.
- 2) To explore the primary reasons for the occurrence of these posture deviations among bodybuilding practitioners within the research sample.

4. Terminology of Study:

- 1) Postural deviations: Refers to abnormalities in the shape of an organ or body part, deviating from its normal, physiologically sound position, thereby altering its relationship with other organs (Al-Sumaidaie, 2002).
- 2) Bodybuilding: The sport involving the development of the human body through training, exercises, and balanced physical conditioning (abdomen, back, chest, arms, legs), aiming to enhance appearance and increase muscle strength and development throughout the body (Ahmed, 2012).
- 3) The coach: An educational figure responsible for guiding and training athletes, directly influencing their athletic performance and contributing significantly to their holistic development (Wagdi Mustafa, Mohamed Lotfy, 2002).
- 4) Posture: The natural position of body parts in anatomical harmony, allowing muscles to exert minimal effort while maintaining alignment and balance (Abbas, Abdel Halim, 1981). Posture depends on the condition of bones, muscles, and ligaments; weakening of these muscles can disrupt body balance and alter natural shape, resulting in posture deviations (Hayat, Raphael, 1991).

5. Similar Studies:**5.1. Pausic, Pedisic, and Dizad (2010):**

- Title: The Validity of the Photographic Approach to Assessing Figures from Standing Position among Children in the Primary Stage.

This study utilized a descriptive approach, examining a sample of 273 students aged between 10 and 12 years. It involved capturing three images (front and side views) per participant using the Softweer program for analysis. The researcher employed the correlation coefficient, which demonstrated the program's efficacy in analyzing image textures.

5.2. Abdelkader Hajji, University of Biskra (2017):

- Title: Postural Deviations Affecting the Spine and Their Causes Among Middle School Students

This study aimed to identify common postural deviations, especially those affecting the spine among middle school students. It discussed reasons such as non-scientific sports training practices and injuries contributing to posture deviations. Published in the Journal of Human Sciences at the University of Biskra.

5.3. Lamia Muhammad Abdel-Al Ahmed (2020):

- Title: Common Postural Deviations in Upper Extremities and Torso among Students in the First Three Grades of Basic Education

This study employed a descriptive mixed-method approach among students in the first three grades of basic education. It included a basic sample of 150 students and an exploratory sample of 20 students, utilizing the posturescreenMob application. Results showed a significant prevalence (95.94%) of postural deviations in the upper limbs and torso, with 55% showing curvature of the back.

5.4. Reda Muhammad Ibrahim (2021):

- Title: Survey Study of Serious Injuries Among Bodybuilding Players at Minya University Shooting Club, Egypt

This study used a descriptive survey approach among bodybuilding players at a shooting club in Cairo. A random sample of 120 players was surveyed, identifying the shoulder, elbow, and lower back as the most injury-prone areas. Common causes included disregarding trainer instructions and inadequate training equipment.

5.5. Trovato et al., University of Catania (2022):

- Title: *Assessing Posture in Healthy Adults Through a Reproducible Digital Method*

Researchers employed a simple, inexpensive method using a mobile phone to evaluate posture in 100 healthy volunteers (50 males, 50 females) with an average age of 23.4 years. Utilizing the APECS application, the study highlighted the application's accuracy and efficiency, recommending its use by doctors in assessing posture differences between genders.

5.6. Imama Arafat et al., Pakistan (2024):

- Title: Prevalence of Poor Body Posture Among Physical Therapists Using the APECS Application
This study investigated the prevalence and effects of poor body posture among physical therapists in Lahore. Findings indicated that 56% of participants suffered severe disturbances, 32% mild disturbances, and 12% maintained normal posture. The study underscored the need for early intervention in posture management and advocated for the APECS application as a beneficial tool in healthcare.

II. Methods and Materials:**1. Method:**

To ensure credible results suitable for this study's nature, we employed the descriptive analytical method within a community of bodybuilding practitioners in the city of Tebessa.

2. Research Community:

We selected 270 bodybuilding athletes who regularly attend training halls in Tebessa. They consented to photography and videography of their semi-naked bodies for the purpose of scientific research.

3. Research Sample:

From the bodybuilding practitioners, we purposively chose a sample of 51 athletes exhibiting one or more posture deviations. These deviations were analysed to benefit scientific research.

4. Data Collection Tools:

- APECS Application: The researcher used this mobile application to assess athletes' posture through photography and digital analysis.
- Questionnaire: Athletes with detected physique deviations were given a 22-question closed questionnaire focusing on training content and coaching.
- Photographic Device: A Huawei P30 mobile phone was utilized for photography.
- Tripod Phone Holder: Used to stabilize the camera and ensure quality images.
- Coloured Tapes: Applied to joint areas to enhance clarity in photographic analysis.

Table (1): The distribution of the sample and the research population

Sample Distribution	Number	Percentage	Note
Total community	270	100%	/
Exploratory sample	5	/	Out of sample
Base sample	51	18.88%	/

5. Presentation of the APECS Application (Analyse Posture Evaluation and Control System)

APECS is a semi-free Android application designed to utilize advanced optical imaging algorithms for accurate assessment and control of body posture. It offers multiple modes, including rapid analysis of front, back, right, and left side positions, as well as Amplitude of Movements (Mvts) analysis. A notable feature is the comprehensive analysis of the entire body using the Golden Analysis mode, alongside smart video analysis of movement textures.

Moreover, APECS provides anthropometric measurements and detects deviations across the entire body, including spine evaluation and torso deviation detection. The application suggests specific motor rehabilitation exercises tailored to each detected deviation. Each evaluation concludes with a detailed report outlining posture issues and rehabilitative solutions.

APECS has undergone evaluation by specialist doctors and has been adapted to address a wide range of posture problems effectively and efficiently. It also ensures user privacy by obscuring the face in reports and saving information in PDF format upon clicking the Save button, which includes the user's name and date of birth.

(Captures are shown in Appendices)

6. Survey:

The researcher, supported by a team of specialist colleagues, conducted an exploratory study involving a sample of 5 athletes for experimentation and exploration. The study utilized the APECS application under the researcher's supervision with the following objectives:

1. Validate and assess the effectiveness of the application, despite previous studies confirming its efficacy.
2. Gain proficiency in using the application to prevent future errors.
3. Identify technical and practical challenges encountered with the application and study sample to mitigate them in future applications.
4. Manage the timing of tests conducted and thereby control the overall study sample duration.

7. The main study:

These procedures were applied to a sample of 270 individuals inside bodybuilding training halls in the city of Tebessa, with the consent of both hall administration and individual athletes. Prior to the study, an explanatory advertisement signed by the researcher and authorized by the administration was published.

The study was conducted in several stages:

- Appointments were scheduled with the directors of each hall to capture front, side, and back photos of each individual, with specific areas marked to detect deviations.
- These images were meticulously entered and organized on the application page: first, the side images alone, followed by the front images. The application provided biomechanical and anatomical analyses of these images, generating comprehensive reports on identified deviations along with tailored rehabilitation programs.
- Emphasis was placed on consistent lighting and a flat, uninterrupted backdrop.
- Subsequently, the collected data was sorted and analysed. Athletes exhibiting posture deviations, whether in the neck, shoulders, pelvis, knees, or feet, were selected for further research. A total of 51 athletes with posture deviations were identified.

8. Statistical Analysis:

A questionnaire was distributed to the 51 selected athletes. Upon retrieval, the responses were transcribed and organized for processing and analysis using the SPSS program. Statistical methods included frequencies, percentages, chi-square tests, standard deviation, arithmetic mean, and Pearson's coefficient.

9. Scientific Coefficients of the tests:

Table (02): The reliability of the test

Test	Unit of measurement (degree)	Test 01		Test 02		Reliability
		Arithmetic average	Standard deviation	Arithmetic average	Standard deviation	Pearson's coefficient
APECS	Body straightening	2.6	1.14	2.2	1.09	0.88
	Head tilt (right – left)	3.00	1.22	3.00	1.41	0.86
	Shoulder straightening	3.4	0.54	3.6	0.89	0.91
	Pelvic tilt	3.6	0.89	3.4	0.54	0.99
	Knees	1.80	1.30	2.00	1.73	0.99
	Feet	1.40	0.54	1.40	0.54	1.00
	Lateral body straightening	1.20	0.83	1.00	1.00	0.89
Questionnaire topics	Training content	5.20	2.86	5.40	2.88	0.98
	Coach	6.20	4.20	6.20	3.83	0.98

9.1. Test Reliability:

Using the test-retest method, we found that the Pearson coefficient values ranged from 0.86 to 1 across all body deflection locations and questionnaire axes, indicating the stability of the tests.

9.2. Validity of the Test:

To establish the validity of the study tool (the questionnaire), the researcher sought expert validation of its content by presenting it to a panel of specialized doctors. They evaluated its linguistic integrity, clarity of meanings, suitability of paragraphs to study hypotheses, and alignment with study objectives. Based on their feedback, some paragraphs were revised or removed until the questionnaire achieved its current form.

III. Results and discussion:**Table (3): The results of postural deviations after APECS tests**

	Body straightening	Head tilt	Shoulder straightening	Pelvic tilt	Knee	Foot	Lateral straightening
1	1°	2°	2°	6°	3°	0°	
2	1°	2°	6°	0°	2°	0°	
3	3°	°1	°5	°1	°0	°0	
4	2°	°5	°1	°0	°0	°1	
5	3	°6	3	1°	2	1°	
6	2°	1	°5	2	1°	2°	
7	2	2	6	0°	1	2	
8	2°	5	2	1°	2°	1°	
9	1°	2	1	6	3	2°	
10	3	4	5	0°	2°	1	
11	2°	3	6	1	1°	2°	
12	3	2	2	3	5	1°	
13	5	2	1	0°	1°	2°	
14	2°	7	3	2	0	1	
15	1	1	5	2	2°	1°	
16	2°	1	1	3	4	2°	5
17	1°	2	6	0°	1°	2	
18	3	2	2	3	5	2°	
19	2°	7	2	2	2	1°	
20	5	2	1	2	1	2°	
21	1°	1	5	0°	2°	1	
22	2°	2	3	5	1°	2	
23	2°	3	2	0°	0°	2°	5
24	1°	5	2	1	2	0°	
25	1	1	5	2	2°	1°	
26	1°	6	0	0°	4	2°	
27	1	2	1	6	1°	2	
28	1°	0	2	5	3	2°	
29	2°	6	2°	0°	2°	0°	
30	1°	2	2	1	5	1°	
31	°5	1	1	0°	0°	0	
32	1	5	2	1	2°	2°	
33	2°	2	3°	5	1°	1	
34	1°	2	5	0°	2°	0°	
35	2°	1	6	2	2°	0	
36	3	5	2°	0°	3	1°	
37	1°	2	3	2	5	2°	
38	2	2	1	2	1°	2°	5
39	2°	6	2°	0°	2°	1	
40	1°	2	5	2	1	1°	
41	2	1	1	2	0°	2°	6
42	2°	5	2	2	1°	0	
43	1°	2	°6	0°	2°	0°	
44	1	2	2	6	2°	1°	
45	°5	2	2	2	1	2°	
46	1°	5	2°	0°	1	0	
47	0°	1	1	5	1°	0°	
48	1°	2	2	0°	5	1°	
49	1	1	5	1	2°	0	
50	2°	5	1	0°	1	2°	
51	1°	3	2	2	1°	0	

Table (04): The nature of the deviations of the sample members

Type of deviation	Frequency	Percentage	Body Part
Body straightening	04	7,84%	Frontal
Head tilt (right – left)	14	27,45%	Upper
Shoulder straightening	16	31,37%	Upper
Pelvic tilt	08	15,68%	Upper
Knees	05	9,80%	Lower
Feet	00	00%	Lower
Lateral body straightening	04	7,84%	Lateral

1. Discussion of the first hypothesis: Bodybuilding athletes exhibit various postural deviations primarily affecting the upper and lower front sides as well as the sides.

Tables (2) and (3) provide insights into the common posture deviations among bodybuilding practitioners. It is evident from these tables and the response to the first question that:

The most prevalent posture deviations among the sampled athletes include a shoulder drop (31.37%), followed by head tilting (27.45%), knee deviations (9.8%), and forward head posture (7.84%). Foot deviations were the least prevalent.

Table (5): The outcomes related to the first hypothesis questions concerning the training program.

Question		Frequencies		Percentage	Tabular Chi-square	Calculated Chi-square	Statistical significance
01	Do you have a training program prepared by a specialized expert?	Yes	48	94.11 %	3.84	39.706	There are statistically significant differences
		No	03	5.88%			
02	Do you think the training program should take into account your capabilities?	Yes	50	98.03 %	3.84	47.078	There are statistically significant differences
		No	01	1.96%			
03	Do you think the training program should take into account your goals?	Yes	49	96.07 %	3.84	43.314	There are statistically significant differences
		No	02	3.92%			
04	In your opinion, what are the reasons why this program does not achieve its stated goals? Is it due to a poor level, lack of variety in exercises, inappropriate exercises, or lack of tools?	Poor level	27	52.94 %	7.81	38.333	There are statistically significant differences
		Non-diverse exercises	20	39.21 %			
		Inappropriate exercises	03	5.88%			
		Lack of tools	01	1.91%			
05	Do you experience muscle pain after a period of training?	Yes	44	86.27 %	3.84	26.843	There are statistically significant differences
		No	07	13.72 %			
06	Do you experience a decrease in range of motion after a period of training?	Yes	43	84.31 %	3.84	24.020	There are statistically significant differences
		No	08	15.68 %			
07	Do you believe that your training program should include all muscle groups?	Yes	48	94.11 %	3.84	39.706	There are statistically significant differences
		No	03	5.88%			
08	Do you think that adjusting your training loads within a program should be developed by your personal trainer?	Yes	47	92.15 %	3.84	36.255	There are statistically significant differences
		No	04	7.84%			
09	Do you think that the comfort factor after each exercise is an indicator that helps you avoid exhaustion and fatigue?	Yes	50	98.03 %	3.84	47.078	There are statistically significant differences
		No	01	1.96%			
10	Do you recognize the importance of repetitions and sets in designing a program that considers your physical capabilities?	Yes	49	96.07 %	3.84	43.314	There are statistically significant differences
		No	02	3.92%			

2. Discussion of the second hypothesis: The absence of a scientifically based training program leads to physical deviations among bodybuilders.

In Table (05), upon reviewing the responses of the sample members to the questionnaire:

A significant majority of trainees, approximately 94.11%, do not follow a specialized training program. This suggests that the sample members do not adhere to a structured training regimen, increasing their susceptibility to training errors that may result in physical deviations. This finding aligns with Tamim Khaled's assertion that preventing injuries in bodybuilding hinges on consistent training with exercises tailored to enhance athletic performance, emphasizing the importance of methodical training planning comprehensible to coaches (Khaled, 2017).

Moreover, 98.03% and 96.07% of respondents respectively emphasized the importance of tailoring training programs to individual abilities and goals. This underscores their belief that any program should consider their capacities and objectives, which is not the current practice among them. This sentiment resonates with Hamid Mohtashem et al., who argue in "Identifying the Causes and Recurrence of Bodybuilding Injuries" that trainers must instruct exercises appropriate to trainees' capabilities without premature weight increases to avoid undue stress (Mohtashem, Shaheen, 2019).

These findings highlight that the lack of goal-oriented training plans contributes to training errors adversely impacting physical health, a view corroborated by Lavallee and Bolam, who identify disproportionate training relative to goals as a source of muscular and tendon injuries (Lavallee, Bolam, 2010).

Regarding the reasons for this program not achieving its desired goals, 52.94% of respondents believed that one of the reasons for the program's failure to succeed was its weak content. Additionally, 39.21% felt that the lack of diversity in its exercises contributed to its shortcomings, as noted by Chi. The calculated chi-square value exceeded the tabular value at a significance level of 0.001, with 01 degree of freedom for all questions. Therefore, there is a statistically significant difference favouring the most common response. A significant proportion of respondents, approximately 86.27%, reported experiencing injuries post-training, and 84.31% noted a decrease in range of motion after consecutive training sessions. These findings suggest that many participants suffer from reduced flexibility and muscle soreness due to training without a scientifically-based program designed by a specialist. The importance of a program grounded in scientific principles is underscored. The researcher attributes these issues to the training content discussed in the fourth question, which may cause excessive strain on muscles, bones, and joints.

Moreover, 94.11% of the trainees believed that the training program should encompass all muscle groups in the body. This belief underscores the importance they place on a comprehensive training regimen for the success of their training process, a component notably absent in the study's sample, which trained without any structured program. This aligns with findings from Yahya Ismail Al-Hawi's study, where he emphasized the crucial role of sports planning. According to Al-Hawi, the absence of such planning leads to confusion and improvisation, contributing to various challenges athletes face, both physical and health-related (Yahya Ismail, 2002).

98.03% of respondents believed that the comfort experienced after each session is an indicator that helps athletes avoid fatigue. This underscores the importance of comfort in preventing fatigue, a factor not addressed in our study's training program. This finding aligns with Hamed Mohtashem and colleagues' study, where they emphasized the necessity of warm-ups before engaging in any sport to prepare the body for strenuous activities (Mohtashem et al., 2019).

The same applies to sets and repetitions. 96.07% of the sample believed that they are of great importance in designing a training program that considers the physical capabilities of the trainees. The calculated Chi-square for all questions was also greater than the tabular value at a significance level of 0.001, with 01 degree of freedom, indicating significant differences. This statistical significance favours the most frequently asked questions, explaining why sample members understand the importance of these indicators in designing a scientifically prepared training program that respects athletes' privacy and individual differences. This finding aligns with

Baychel's study, which concluded that correct use of machines, selection of appropriate exercises, and controlled exercise pace must be taught (Medicine, 1992).

Table (6): The results of the third hypothesis concerning the effective coach.

Question		Frequencies		Percentage	Tabular Chi-square	Calculated Chi-square	Statistical significance
01	Do you have a coach?	Yes	50	98.03%	47.078	3.84	There are statistically significant differences
		No	01	1.96%			
02	Do you receive directions on how to use the machines properly?	Yes	05	9.80%	32.961	3.84	There are statistically significant differences
		No	46	90.19%			
03	Do you think the coach should participate in planning your training program?	Yes	48	94.11%	39.706	3.84	There are statistically significant differences
		No	03	5.88%			
04	Do you think the role of the coach is important in programming exercises that are compatible with your physical capabilities?	Yes	49	96.07%	46.080	3.84	There are statistically significant differences
		No	01	3.92%			
05	Do you think the role of the coach is important in suggesting exercises that are compatible with your goals and technical level?	Yes	51	100%	51.00	3.84	There are statistically significant differences
		No	00	00%			
06	Do you realize the importance of the coach's role in planning your training loads that suit your abilities?	Yes	50	98.03%	47.078	3.84	There are statistically significant differences
		No	01	1.96%			
07	Do you conduct periodic tests?	Yes	08	15.68%	24.020	3.84	There are statistically significant differences
		No	43	84.31%			
08	Do you warm up before starting training?	Yes	38	74.50%	12.255	3.84	There are statistically significant differences
		No	13	25.49%			
09	Do you do muscle flexibility exercises during the training session?	Yes	37	72.54%	10.373	3.84	There are statistically significant differences
		No	14	27.45%			
10	Do you imitate older athletes in their exercises and training loads?	Yes	44	86.27%	26.843	3.84	There are statistically significant differences
		No	07	13.72%			
11	Have you suffered previous injuries during training?	Yes	50	98.03%	47.078	3.84	There are statistically significant differences
		No	01	3.92%			
12	What caused these injuries?	Overloading	31	60.78%	17.412	5.99	There are statistically significant differences
		Performance technique	11	21.56%			
		Imitation	09	17.64%			

3. Discussing the third hypothesis: The absence of a competent coach affects athletes, leading to physical deviations in bodybuilding practitioners.

After analysing Table (06) and reviewing responses related to the third hypothesis, it became evident that:

98.03% of the athletes do not have a coach. This lack of coaching may explain the sample members' unawareness of the importance of having a competent coach who can guide them to avoid training errors that contribute to health problems and physical deviations. This finding aligns with the conclusions of Reiser et al.'s study on athlete injuries, where supervised training by coaches was credited with reducing these injuries in bodybuilding (Risser & Preston, 1990).

A significant 90.19% of the respondents reported not receiving repeated guidance on the correct use of training machines. The researcher attributes this to the absence of competent trainers who oversee athletes' training sessions and correct improper techniques. This finding aligns with Tj. N's study on 'Weightlifting and the Risk of Shoulder Injuries,' which emphasizes that incorrect techniques place excessive strain on the shoulders, leading to injuries. Teaching proper technique can therefore mitigate these risks, as also noted in Hamid Mohtashem's review, which highlights that injuries often stem from insufficient knowledge of exercise machines (TJ N, 1991).

Additionally, 94.11% of the sample members expressed the belief that the trainer should be involved in planning the training program. The researcher attributes this to the sample members' recognition of the critical role that trainers play in developing programs that adhere to established training principles, aiming to prevent deviations that could lead to errors. This assertion is supported by Risser's study, which confirms that supervised training by professional trainers contributes to a reduction in bodybuilding injuries (Risser & Preston, 1990).

Furthermore, beyond the responses to the fourth, fifth, and sixth questions, sample members believe that the coach's role is crucial in designing exercises that align with their physical and technical abilities, as well as their desired objectives, with percentages ranging from 96.07% to 100%. This perspective is echoed in Hamed Mohtashem's review, where he emphasizes the coach's role in injury prevention among bodybuilding athletes through tailored and suitable exercise prescriptions (Mohtashem & Shaheen, 2019).

While 98.03% of the respondents were aware of the coach's role in planning their training loads, this finding is consistent with the observations made by Wang et al. They reported that 60% of bodybuilding and strength athletes attributed exhaustion and fatigue to inadequate control over their training loads, highlighting the importance of having a knowledgeable and capable trainer (Wang, Shi, Zuo, 2000).

Additionally, 84.31% of the respondents did not undergo periodic testing, underscoring the pivotal role of the coach who conducts these assessments. The coach uses the test results to tailor training loads and intensity accordingly. This aligns with Mahdi Mohtashem's study, which emphasized the importance of a specialized medical examination to ensure athletes are physically fit. Certain health issues can limit weight training, while structural problems may predispose athletes to injury. Regular checks for pulse, heart conditions, and high blood pressure can also help prevent muscle injuries (Mohtashem, 2006).

Moreover, 74.50% of the respondents did not warm up before each session. The researcher attributes this to the inadequate value and quality of warm-ups, which often fail to meet the necessary standards. This may be a common oversight within gym facilities. This observation aligns with Hamid Mohtashem's review, which emphasizes the importance of warming up before exercise. A proper warm-up is essential to prepare the body for strenuous activities and reduce the risk of injury, particularly in disciplines like bodybuilding (Mohtashem & Shaheen, 2019).

A significant percentage, 72.54% of the respondents, reported not performing flexibility exercises. This lack of attention to muscular flexibility within gym facilities could have adverse effects on physical health, particularly in disciplines like bodybuilding that emphasize muscle growth. This finding aligns with Salerno's study, which highlights that injuries during sports activities often result from falls, friction, or inadequate exercise techniques, exacerbated by neglect of stretching exercises (Salerno, 2009).

While 86.27% of the respondents imitated older athletes in their exercises and training volumes, this can be attributed to the sample members' lack of awareness regarding specific bodybuilding training principles and individual differences. The absence of a coach likely contributed to the random and imitative approach observed, aligning with Reeser and others' observations on injuries occurring without proper coaching supervision (Risser & Preston, 1990).

Furthermore, 98.03% of the respondents reported previous injuries, underscoring the importance of a trainer who oversees all aspects of training, including physical, technical, and psychological elements. This presence is crucial in preventing many injuries.

Regarding the twelfth question, 60.78% of the sample attributed injuries to overloading, while 21.56% identified improper technique as a contributing factor. These findings highlight the coach's pivotal role in managing training loads, teaching correct techniques, and addressing implementation errors, which echoes findings from previous studies discussed earlier.

IV. Conclusions and Recommendations:

1. Conclusions:

Based on the study's findings, the following conclusions have been drawn:

- Bodybuilding practitioners exhibit common physical deviations, such as a tilted neck and a dropped shoulder, at a high rate as estimated by the study sample, along with other deviations such as a distorted pelvis, knee, or feet.
- The study sample trained without a program grounded in scientific principles tailored to their overall objectives. This approach, aligned with the physical and technical abilities of the trainees, emphasized comfort to prevent exhaustion and fatigue, while planning appropriate loads to ensure a logical progression. These factors contributed to muscle soreness and reduced range of motion. In some cases, this led to postural deviations among the sample members, validating the second hypothesis.
- The study sample lacked the guidance of a competent, specialized trainer capable of directing machine usage and developing personalized training programs that consider individual physical and technical differences. Absence of such expertise led to neglect of warm-up routines and muscle flexibility, resorting instead to generic programs from sources like YouTube and Facebook. This underscores the significance of knowledgeable trainers in gym environments, affirming the third hypothesis.

2. Recommendations:

In light of these findings and the research objectives, the following recommendations are proposed:

1. Emphasize the use of training programs founded on established scientific principles and training methodologies.
2. Define clear program goals that encompass the athlete's physical, technical, psychological, and genetic attributes.
3. Ensure program content includes a variety of integrated exercises aligned with overarching program objectives.
4. Acknowledge sport-specific requirements and individual athlete differences, recognizing that what suits one may not be suitable for another.
5. Develop comprehensive programs that foster balanced muscle development across the athlete's body.
6. Prioritize the involvement of competent, specialized trainers to achieve training objectives safely and effectively, mitigating the risk of injuries and physical deviations.
7. Avoid increasing training loads without mastering proper technique, as this can strain bones, joints, and muscles, particularly for beginners.
8. Plan training loads under the guidance of qualified trainers, avoiding reliance on imitation or generic programs from unofficial sources like YouTube and Facebook.
9. The necessity of starting with physical, medical, and even laboratory tests is paramount, without neglecting warm-up and stretching exercises, to build a sound and accurate program.

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Appendices:

