



THE EFFECT OF SMOKING ON AEROBIC ENDURANCE AND CERTAIN HEART FUNCTIONS IN YOUTH BASKETBALL PLAYERS AGED (17-18) YEARS

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Abstract: The research aims to determine the effect of smoking on youth basketball players, both smokers and non-smokers, regarding aerobic endurance, and to determine the effect of smoking on youth basketball players, both smokers and non-smokers, regarding certain heart functions. The sample consists of a group of players from the Ramadi Sports Club basketball team, totaling (10) players, following the conclusion of the training season for the 2023/2024 season. Their ages range from (17-18) years. Within the single group, they are divided into two groups: (5) smokers and (5) non-smokers. Through tests conducted on the experimental group, results, analysis, and discussion of the research variables appeared. The researcher concluded that there are statistically significant differences between smoking and non-smoking youth basketball players in aerobic endurance, the functional indicator Heart Rate (H.R), the functional indicator Systolic Pressure, and the functional indicator Diastolic Pressure, in favor of the non-smokers. There are many negatives of smoking on the athlete's body and functional systems, as smoking has a significant impact on various body systems. Smoking increases the heart rate, blood pressure, and blood coagulation, and it decreases aerobic endurance capacity in sports exercises.

Keywords: Endurance (Aerobic), Heart rate, Systolic Pressure, Diastolic Pressure.

1. Introduction

1-1 Research Introduction and Importance

Praise be to God who granted us health and wellness to aid us in living our lives, made good things lawful for us, and prohibited malicious things. Undoubtedly, smoking has become a dangerous phenomenon and a health, economic, and social problem in all countries of the world. To solve this problem, we must identify all its aspects in hopes of finding a solution to prevent it or at least limit this dangerous phenomenon. Physical education has become one of the measures indicating the progress of nations and their civilizational advancement as a result of the scientific progress achieved in this field, in addition to the interaction of physical education sciences with other sciences that have contributed significantly and effectively to developing and raising the athletic level of all sports events and activities. The game of basketball is one of the important team sports and competitive activities that provide its practitioners with experiences, physical capabilities, skills, and educational values based on scientific foundations, contributing to achieving high achievement, development, and winning. Basketball requires special physical preparation in order to raise the player's efficiency and ability to practice this game, as the player is required to have high speed in transition, power characterized by speed in jumping, accuracy in shooting and passing, and fluidity in dribbling. Preparing players physically and skillfully is one of the fundamental duties of sports training to confront the preparation and special requirements of the game with the least effort along with the ability to quickly return to the normal state. Endurance (Aerobic Endurance) is considered one of the very important physical attributes that interacts with other physical attributes such as speed, strength, agility, flexibility, or elongation, although this occurs in different proportions depending on the type of sports activity practiced and its nature. Endurance is linked to the phenomenon of fatigue, through which the level of physical fitness of the player can be



evaluated, as fatigue reveals the limits of endurance. Therefore, experts considered "Endurance" one of the main aspects for winning matches and deciding results. As we are addressing the "attribute of endurance," we see through its concept that it constitutes an extremely important influence on human activity. Because the requirements of endurance are numerous, the work performed by a human for a continuous period requires the involvement of various bodily systems for this work. Through this, we see that the concept of endurance is "the susceptibility of organic systems (circulatory, respiratory, muscular, and articular) to continue the required performance for the longest duration; it thus means maintaining work at moderate intensity for a long period of time" (Saleh Shafi, 2011, p. 239). Basketball is a game with numerous physical requirements; the player needs speed, strength, and endurance, as well as the ability to continue performance during the four periods of the match which extend to 40 minutes. Some studies indicate that "the distance a player covers during a match on a court 28 meters long and 15 meters wide is between 5-8 kilometers" (Smith, HK Thomas SG, 1991, p. 289). This distance is covered by the player quickly back and forth along the court, in addition to executing the required defensive and offensive duties during the match, as well as pivoting movements, jumping, and others. Accordingly, the functional work faced by basketball players during the match is of high intensity. The requirements of this work regarding very high aerobic and anaerobic capabilities need high functional efficiency from all body members and systems to meet those requirements. Since physical performance during the match depends on energy production via anaerobic and aerobic methods, the coach must give maximum importance to the functional requirements relied upon and subsequently conduct periodic tests on the players, as "knowledge of physiological phenomena helps in understanding behavioral phenomena" (Abdul Rahman, 1982, p. 311), and consequently the ability to interpret the state of acceleration or deceleration in performance during the match. The functional capabilities possessed by a basketball player, which make him capable of continuing to play without a drop in his performance level, are linked to the player reaching the stage of adaptation and resistance to fatigue and drop in level and performance. The importance of the research appears through identifying the effect of smoking on aerobic endurance and certain heart functions in youth basketball players.

1-2 Research Problem There is no doubt that smoking has a bad effect on the nervous system, the circulatory system, the heart, the respiratory, digestive, urinary, and reproductive systems. Therefore, the smoking athlete loses his basic advantages such as speed, toughness, and skill, and his physical fitness decreases significantly. Smoking affects the amount of oxygen the athlete's body needs to perform the process of combustion and metabolism to match the muscular effort performed by the athlete, which limits his capabilities and efficiency. Nicotine also badly affects the athlete's eyesight, hearing, and the rest of his senses. Therefore, smoking must be fought among athletes who are required to endure the greatest efforts to obtain higher results on their way to breaking unbroken records. From the above, it is clear to us that we are facing a dangerous and large-scale problem that is considered one of the most dangerous economic problems locally and globally. Tobacco companies compete in spreading and establishing their foothold in global markets and compete in manufacturing. Instead of building institutions to provide services to these youths, billions are spent on tobacco cultivation and industry, and millions more are spent to buy it and buy cigarettes. Hence, the major economic problem included several aspects. The research problem lies in knowing: Does smoking affect the attribute of general endurance and certain heart functions in youth basketball players?.

1-3 Research Objectives

1. To determine the effect of smoking on youth basketball players, both smokers and non-smokers, regarding aerobic endurance.
2. To determine the effect of smoking on youth basketball players, both smokers and non-smokers, regarding certain heart functions.



1-4 Research Hypotheses

1. There are statistically significant differences between smoking and non-smoking youth basketball players in the Ramadi Club regarding aerobic endurance, in favor of non-smokers.
2. There are statistically significant differences between smoking and non-smoking youth in the Ramadi Club regarding the functional variable Heart Rate (H.R), in favor of non-smokers.
3. There are statistically significant differences between smokers and non-smokers regarding the functional variable Systolic Pressure, in favor of non-smokers.
4. There are statistically significant differences between smokers and non-smokers regarding the functional variable Diastolic Pressure, in favor of non-smokers.

1-5 Research Domains

1-5-1 Human Domain: Youth players of the Ramadi Sports Club basketball team (First Division) in Anbar Governorate, totaling (15).

1-5-2 Temporal Domain: The period from Tuesday, 24/4/2024 to Sunday, 2/7/2024.

1-5-3 Spatial Domain: Ramadi Sports Club Hall/Court – Ramadi District – Ramadi General Hospital Laboratories.

1-6 Definition of Terms

1-6-1 Smoking: Smoking is a process in which a substance is burned; often this substance is tobacco, where the smoke is tasted or inhaled (Fadel, 2012, p. 8). Smoking was defined in the Iraqi Anti-Smoking Law No. (19) of 2002 as the consumption of tobacco products of all kinds, such as cigarettes, hookahs (shisha), and pipes (Anti-Smoking Law, p. 39).

What is Smoking?

Smoking from a Chemical Point of View: The process of smoking from a chemical point of view is considered a destructive distillation process of tobacco resulting in multiple substances: nicotine, ammonia, carbon monoxide, volatile oils, and other toxic and dangerous substances.

Smoking from a Physiological Point of View: The process of smoking from a physiological point of view is considered a process of sensation and tasting. The burning cigarette generates a delicious and false sensation for the smoker, especially after eating, upon waking from sleep, and during daily work. It is not an addiction nor is it considered a physiological need among the human body's needs; rather, it is a bad pathological habit not linked by any organic link to any functional need of the human body, and it is a dangerous enemy to human health.

1-6-2 Endurance (Aerobic): Defined by (Saleh Shafi, 2011) as (the ability of the circulatory and respiratory systems to supply the body with oxygen to continue working for the longest possible period) (2) (Sajit, Management, 2011). It aims to develop the endurance of the whole body, which is essential for all sports activities and depends on improving the vital systems in the body. It is similar in almost most games, and general endurance components may not agree with the nature of the game. It involves the general development of the body without focusing on specific dimensions, and also involves the development of large general muscles of the body and improving the work of the circulatory and respiratory systems (Hassanein, 1998, p. 196).

1-6-3 Heart Rate: Heart rate is considered one of the important indicators relied upon in medical examinations, and this is inferred through the changes that occur on the cardiac waves (P.Q.R.S.T.) which appear during electrocardiography. Thus, most researchers, even if they differ in defining the pulse rate, agree that the heart pulse ranges between (60-80) beats/minute.

1-6-4 Systolic Pressure: It is the pressure generated as a result of the strength of the heart muscle and the pumping of blood inside the arteries, added to it the resistance of the arterial walls to the passage of blood. It



reaches (120-140) mmHg and rises during physical effort, nervous and psychological tension, and salt intake. (Samia Khalil, 2008, 163) .

1-6-5 Diastolic Pressure: It is the pressure resulting from the relaxation of the heart muscle which is generated in the arteries. It is sometimes called the low pressure and equals (70-80) mmHg (Ahmed Nasrallah, 2003, p. 165). *What is blood pressure?* Blood pressure is the force of blood against the walls of the arteries. Blood pressure is recorded as two numbers: Systolic Pressure (pressure when the heart beats) over Diastolic Pressure (pressure when the heart relaxes between beats). We record that with systolic blood pressure first (at the top) and diastolic pressure second (at the bottom). For example, if the systolic blood pressure is 120 mmHg (millimeters of mercury) and the diastolic pressure is 80 mmHg, we describe the blood pressure as "120 over 80", written 120/80. The top number is called Systolic Pressure. The top number measures the pressure in the arteries while the heart is beating. The bottom number is called Diastolic Pressure. The bottom number measures the pressure in the arteries between heartbeats.

2. Similar Studies

First Study: A study by Salem (2002), a "PhD dissertation" titled "Psychological and Social Motives for Cigarette Smoking among Middle and High School Students in Egypt." The study aims to identify the reasons for cigarette smoking among a sample of male and female adolescents, identify the differences between male and female students in scale dimensions according to their gender difference, and design a scale determining the motives for cigarette smoking.

Second Study: A study by Moayad Abdul Ali Al-Taie (2012), a "Master's thesis" titled "The Effect of Endurance Effort on Certain Respiratory System Variables in Soccer Players". This study aimed at endurance tests of both general and special types and was not content with knowing the effect of general endurance only, but aimed to identify the effect of endurance on certain respiratory system variables.

3. Research Methodology and Procedures

3-1 Research Methodology: The research aims to determine the differences between smokers and non-smokers in aerobic endurance and in certain heart functions (Heart rate, Systolic Pressure, Diastolic Pressure). Hence, the experimental method for a single group while identifying the smoker and non-smoker group is the most appropriate method for the research, as the research monitors the differences currently existing between smokers and non-smokers in the researched variables without intervening in them. The research methodology depends on selecting the researched group, which is equal as much as possible in the basic variables that can have an effect on the researched phenomenon except for the smoking variable, to know the differences in the research group in general endurance and certain heart functions. Hence, the researcher considers smoking the independent variable, and general endurance and certain heart functions as dependent variables (Ali et al., 2024; Mohammed Hammood et al., 2025; Mohammed et al., 2025; Omar et al., 2025).

Table No. (1) Research Variables

Independent Variable	Dependent Variable
Smoking	General Endurance Certain Heart Functions: * Heart rate * Systolic Pressure * Diastolic Pressure

The researcher used the experimental method using the (One Group) style to suit the nature of the research. It is the method that enables the true testing of hypotheses of relationships regarding cause or effect (Hassanein, 1994, p. 132).



3-2 Research Sample:

The sample consists of a group of youth players from the Ramadi Sports Club basketball team, totaling (15) players, after the end of the training season for the 2023/2024 season. Their ages range from (17-18) years. Within the single group, they are divided into:

1. **Smokers Group:** Numbering (5) five players who smoke regularly. They were selected deliberately, as the researcher chose them according to the standard of habitual smoking, meaning they smoke daily from 10 – 20 cigarettes or more.
2. **Non-Smokers Group:** Numbering (5) five players from the matched sample type, where they were selected from non-smoking players provided they were equal to the smokers' group in age, height, weight, and training age, and from the same Ramadi Sports Club team.

The pilot experiment was conducted on five (5) players, and after confirming the scientific foundations of the research, they were excluded from the main experiment tests. The research sample was selected by the deliberate method from the Ramadi Basketball Club team. Table (2) clarifies the characteristics of the research sample according to the variables of height, weight, age, and training age.

Table (2) Characteristics of the Research Sample in Growth Rates (Age – Height – Weight – Training Age) N = 10

Variables	Unit	Arithmetic Mean	Standard Deviation	Median	Skewness Coefficient
Chronological Age	Year	17.40	0.54	18.33	0.65
Total Body Height	cm	176.30	5.32	181.38	1.2
Weight	kg	74.22	3.97	48.75	0.75
Training Age	Year	4.1	0.41	3.20	0.33

3-3 Devices and Tools:

- **Devices Used:** Device for measuring pulse and systolic and diastolic blood pressure (Mercurial).
- **Tools:** Stethoscope for counting pulse – Sources and references – Tests – Data dumping form – Court and basketball playground – (10) basketballs – (7) cones.

3-4 Field Research Procedures: Physical Tests (Aerobic Endurance)

3-4-1 12-Minute Run Test (Cooper Test):

- **Purpose of the test:** To measure respiratory-circulatory aerobic endurance.
- **Age Level:** From 6 years and older; suitable for both genders up to the university stage.
- **Tools:** 2 stopwatches, athletics track divided into lanes, lane width 122 cm.
- **Performance Specifications:** The test area is defined on the ground on an athletics track. Start position (High Start) behind the starting line. Upon giving the start signal, the examinee runs quickly until the end of the proposed time.
- **Special Instructions for the Test:** To ensure the competition factor, all players run until the end of the specified time.
- **Test Administration:** Starter at the starting line, 2 timekeepers, recorder to record results.
- **Recording:** The examinee is recorded for the distance covered in a time of 12 minutes.
- **Test Standards:** (Sports Activity Programs Evaluation Laboratory, 2023, p. 189). Cooper set standards for estimating performance on the 12-minute test for two groups of men and women. The following table shows the performance level of the two groups for the test.

Table No. (3) Physical Fitness Levels for All Ages Among Men and Women

Men	Fitness Level (Aerobic Endurance)	Women
2820 meters or more	Excellent	1650 meters or more
2410 meters : 2820 meters	Good	2170 meters : 2640 meters



2010 : 2410 meters	Average	1850 meters : 1830 meters
1610 meters : 2010 meters	Weak	1530 meters : 1830 meters
Zero : 1610 meters	Very Weak	Zero : 1530 meters

3-5 Field Research Procedures: Functional Tests for the Heart

3-5-1 Measuring Systolic and Diastolic Blood Pressure (S.P) and Measuring Heart Rate (H.R): Device for Measuring Systolic and Diastolic Blood Pressure (S.P) and Measuring Heart Rate (H.R): The mercury pressure measuring device (Mercury Sphygmomanometers) resembles the manual device, but mercury is used in it to indicate the amount of blood pressure in the individual. Both the manual and mercury pressure gauges are considered the gold standard for blood pressure readings; thus, they are considered the best device for measuring pressure. One must sit in a relaxed position with the arm relaxed on the table.

Using the Mercury Blood Pressure Monitor, it is important to remember the following:

- Manual cuffs come in different sizes depending on arm size, and using the correct size ensures the most accurate reading.
- Place the sleeve on the arm directly on the bare skin.
- Take deep breaths and relax for up to 5 minutes before measuring blood pressure.
- Avoid talking during the examination.
- Place feet flat on the floor and sit upright while measuring pressure.
- Avoid measuring blood pressure in a cold room.
- Keep the arm near the level of the heart as much as possible.
- Ensure blood pressure is measured at several different times during the day.
- Avoid smoking, consuming alcohol, and exercising for 30 minutes before measuring pressure.
- Empty the bladder before performing the blood pressure test.

How to Measure Heart Rate (There are many ways, including):

Radial Pulse: This is done by following these steps:

- Place the index and middle finger on the inner side of the wrist directly below the thumb.
- Avoid using the thumb to check heart pulses in the radial artery because the artery located in the thumb may make it difficult to count the pulse accurately.
- Once the heartbeat is felt, count the number of beats felt in 15 seconds, then multiply the number by 4 to get the heart rate per minute, or count the number of beats in 10 seconds and then multiply the number by 6.

Carotid Artery Pulse: This is done by following these steps:

- Place the index and middle finger on the side of the windpipe directly below the jawbone.
- Once the heartbeat is felt, count the number of beats felt in 15 seconds, then multiply the number by 4 to get the heart rate per minute.

Top of the Foot Pulse: This is done by following these steps:

- Place the index and middle finger over the highest point of the bone extending along the top of the foot.
- Once the heartbeat is felt, count the number of beats felt in 15 seconds, then multiply the number by 4 to get the heart rate per minute.

Brachial Artery Pulse: This is done by following these steps:

- Work on bending the arm slightly so that the inner arm is facing upwards.
- Place the index and middle finger along the side of the arm between the crook of the elbow at the top and the pointed part of the elbow bone at the bottom.

- Once the heartbeat is felt, count the number of beats felt in 15 seconds, then multiply the number by 4 to get the heart rate per minute.

Heart rate Heart rate measurement



Stethoscope

Mercury sphygmomanometer

Systolic and diastolic blood pressure measurement

Systolic Pressure Systolic blood pressure

Diastolic Pressure Diastolic blood pressure

Figure (1) Mercury sphygmomanometer for measuring the functional variables of the heart: variable heart rate and variable blood pressure

3-6

Pilot

Experiment:

The researcher conducted the pilot experiment on (5) players in basketball for the Ramadi Sports Club for Youth on Thursday (24/4/2024) on (3) three players from the Ramadi Sports Club basketball youth team from outside the research sample. The aerobic load tests and functional tests were conducted. The mechanism for conducting tests and measurements was as follows:

Each player performs the Cooper test, and after finishing the test, the Heart Rate (H.R) and Systolic and Diastolic Blood Pressure (S.P) are measured.

The goal behind applying the pilot experiment is for the researcher to observe:

- Response method, time taken for the test, suitability of the place.
- Settling on the optimal arrangement for tests, identifying errors and obstacles.
- Identifying the capability of the assistant staff, identifying the validity of devices and tools.
- Identifying the ability of sample members to apply the test.
- Confirming the validity of the test (coefficient of difficulty or ease, validity, reliability, and objectivity).

3-7 Scientific Bases of Tests:

3-7-1 Test Validity: Validity means "that the test measures what it was designed for. Sometimes a test is valid at a certain level but may not be valid for another different level, whether in age or gender for the same test. For example, physical fitness tests for juniors differ for the advanced category; similarly, women's tests differ from men's. In the case of applying the same test, it is valid in the first stage and invalid in the second stage."

Test Reliability: Reliability means that if the test application is repeated several times, it gives the same result (Nader Fahmy and Hisham Aliyan, 2005, p. 145). Reliability coefficient was calculated using the (Test-Retest method) with a time interval of (7) days between the first and second tests. The researcher extracted the



reliability coefficient via Spearman's rank correlation coefficient between the results of the first test and the second test as shown in Table (4). **3-7-3 Objectivity:** Objectivity is defined as "meaning that correctors do not differ in estimating answers to test questions" (Laila El-Sayed Farhat, 2001, p. 169) . The researcher used Spearman's rank correlation coefficient for test objectivity between (scores of the first judge and the second judge) as shown in Table (4).

Table (4) Shows the Reliability and Objectivity Coefficient for Tests

No.	Tests	Reliability Coefficient	Calc. (R) Value	Statistical Significance	Objectivity Coefficient	Calc. (R) Value	Objectivity Significance
1	12-Minute Cooper Run Test (Measuring Respiratory Aerobic Endurance)	0.85	4.6	Significant	0.82	3.62	Significant

- Tabular correlation value at significance level (0.05) and degree of freedom (6) reached (0.62).

3-8 Field Procedures for the Research: Tests for the physical study variables (Aerobic Endurance) and certain functional variables of the heart were conducted for basketball players. This procedure was in accordance with the scientific foundations of research. The researcher and the assistant team conducted the physical test for aerobic endurance under the same conditions as the pilot experiment for the research sample: the Cooper test for 12 minutes to measure aerobic endurance. Afterward, the pulse rate and systolic and diastolic pressure were measured one minute after the aerobic endurance test to determine the differences between smokers and non-smokers in the researched variables by the researcher and his assistant team.

3-9 Statistical Methods:

In order to analyze and know the significance of values, the researcher used the electronic computer program Statistical Package (SPSS22) using the following statistical methods (Abdullateef AbdulJabbar et al., 2025; Ali et al., 2022; Fayyad et al., 2025; Hammood et al., 2024; Khalaf et al., 2025):

- Pearson Correlation Coefficient.
- Arithmetic Mean.
- Standard Deviation.
- T-test (for two independent samples).
- Skewness Coefficient.

4. Presentation, Analysis, and Discussion of Results

After the research steps were conducted by executing the tests, the researcher was able to obtain the calculation values for the tests. Physical Tests (Aerobic Endurance) and measurement of certain functional indicators of the heart: Heart Rate (H.R) and Systolic and Diastolic Blood Pressure (S.P).

Presentation of Results for Variables (Aerobic Endurance) and Certain Functional Indicators of the Heart: Heart Rate (H.R) and Systolic and Diastolic Blood Pressure (S.P).

Table (5) Results of (T) test for the experimental group regarding the significance of differences in measuring selected tests in variables (Aerobic Endurance) and certain functional variables of the heart: Heart Rate (H.R) and Systolic and Diastolic Blood Pressure (S.P).

Variables	Smokers Group N= 5	Non-Smokers Group N=5	T-Value	Level of Sig.	Percentage of Change
	Mean	Std. Dev	Mean	Std. Dev	



Aerobic Endurance	2430 Meter/cm	6.4	2825 Meter/cm	5.1	2.26
Heart Rate (H.R)	85 beats/min	4.9	73 beats/min	4.3	2.13
Systolic Blood Pressure (S.P)	135 mmHg	3.6	126 mmHg	2.8	3.02
Diastolic Blood Pressure (D.P)	89 mmHg	5.2	84 mmHg	4.1	2.47

The research variables (Aerobic Endurance) and certain functional variables of the heart—Heart Rate (H.R) and Systolic (S.P) and Diastolic (D.P) Blood Pressure—for members of the experimental group (N=10 Total: Smokers N=5, Non-Smokers N=5).

Comparison of the two study groups of smoking and non-smoking athletes in the research sample in basketball.

- Statistically significant at degree of freedom $(10-1) = (9)$.

Analysis of Results: By looking at Table No. (5), the values of (Arithmetic Mean and Standard Deviation) for the physical variable (Aerobic Endurance) in the research tests are clarified. The value of the (Arithmetic Mean) for Aerobic Endurance for the smokers' group was (2430) (Good) Meters/cm with a standard deviation of (6.4). Regarding the measurement of the non-smokers group, the arithmetic mean value reached (2825) Meter/Centimeter (Excellent) with a standard deviation of (5.1). As for the functional variable for the heart, Heart Rate (H.R), for the smokers' group, the values of (Arithmetic Mean and Standard Deviation) show that the statistical result of the arithmetic mean in measuring the test for smokers is (89 mmHg) [sic: context implies beats/min, text says mmHg] Pulse is High, with a standard deviation of (4.9). As for the non-smokers group, the statistical information for the test shows that the arithmetic mean value is (73 beats per minute), Normal Pulse for an athlete, and the standard deviation is (4.3). As for the functional variable for the heart, Systolic Blood Pressure, for the smokers' group, the values of (Arithmetic Mean and Standard Deviation) show that the statistical result of the arithmetic mean in measuring the test for smokers is (85 beats per minute) [sic: context implies mmHg] Pressure is Above Normal (H. Normal) with a standard deviation of (4.9). As for the non-smokers group, the statistical information for the test shows that the arithmetic mean value is (135 mmHg) Normal Pressure, and the standard deviation is (2.8). As for the functional variable Diastolic Blood Pressure, for the smokers' group, the values of (Arithmetic Mean and Standard Deviation) show that the statistical result of the arithmetic mean in measuring the test for smokers is (89 mmHg) Pressure is Above Normal (H. Normal) with a standard deviation of (5.2). As for the non-smokers group, the statistical information for the test shows that the arithmetic mean value is (84 mmHg) Normal Pressure, and the standard deviation is (4.1).

Discussion of Results: After presenting and analyzing the results, it became clear through the calculation values in the tests for the experimental group of the researched sample that the differences are statistically significant between smoking and non-smoking athletes in favor of the non-smokers. The importance of the research appears through identifying the effect of smoking on aerobic endurance and certain heart functions for youth basketball players through statistical work in the (SPSS) program and according to the percentages of change, (T) value, and its significance level for the variable. The percentage for the physical variable Aerobic Load was (16.25%), T-value (2.26), and significance level (0.05). Aerobic load in basketball is one of the important physical variables in practicing the game of basketball and in matches for the athlete to perform optimally in the game of basketball. Basketball games last up to 48 minutes with overtime in tied game situations. During this time period, it was found that players continue for a distance of up to 5 kilometers



during the match. However, this distance does not reflect the length of efforts and the intensity of physical effort in the activity performed by athletes. Research has shown that during matches, approximately 34% of the time is spent playing, where players walk about 57% of playing time and stand still for 9%. Due to these physiological requirements, basketball requires both anaerobic and aerobic metabolic systems. As for the variables of heart functions, it appeared as follows: Functional variable Resting Heart Rate (H.R), percentage of change (14.11%), tabular (T) value (2.13), and significance level (0.05). Functional variable Systolic Blood Pressure (S.P), percentage of change (14.11%) [sic: table says 6.66%], tabular (T) value (3.02), and significance level (0.05). Diastolic Blood Pressure (D.P), percentage of change (6.66%) [sic: table says 5.61%], tabular (T) value (2.47), and significance level (0.05). The researcher attributes the research results in the statistical information for the research variables, aerobic endurance and certain heart functions, to the fact that Smoking affects the human body negatively. It results in many negative effects harmful to the athlete, and some may lead to complications threatening athletic performance. In fact, smoking harms almost all body organs. It affects the respiratory system, the circulatory system, the reproductive system, the skin, and the eyes, and also increases the risk of developing different types of cancers. It should be noted that smoking leads to addiction to the stimulating substance nicotine found in tobacco, which makes the process of quitting smoking a difficult task. In reality, the negative effects of smoking do not affect the smoker only, as they harm individuals surrounding him who breathe smoke indirectly; therefore, it is possible for them to suffer from the same health problems smokers are exposed to. The effect of smoking on aerobic endurance and certain heart functions is an increase in the percentage of carbon monoxide gas and a decrease in the percentage of oxygen, which causes constriction of blood vessels surrounding the heart and lack of blood reaching them. This results in weakness in the heart muscle, which reduces physical fitness in the athlete in the game of basketball. On the other hand, the tar substance in cigarettes increases blood thickness, causing narrowing of arteries and the occurrence of elevation in heart beat rates and blood pressure rates for the athlete. Perhaps this explains the continuous panting of the smoker, his feeling of exhaustion, and his inability to exert effort. There is no doubt that smoking has a bad effect on the nervous system, circulatory system, heart, respiratory, digestive, urinary, and reproductive systems. Therefore, the smoking athlete loses his basic advantages such as physical fitness and endurance (aerobic endurance) which he needs in skilled performance in basketball. Smoking affects the amount of oxygen the athlete's body needs to perform the process of combustion and metabolism to match the muscular effort performed by the athlete, which limits his capabilities and efficiency. Nicotine also negatively affects aerobic endurance and certain heart functions of the athlete, his hearing, and the rest of his senses. The effect of smoking on heart functions leads to an increase in the percentage of carbon monoxide gas and a decrease in the percentage of oxygen, which causes constriction of blood vessels surrounding the athlete's heart and failure of blood to reach them. This results in weakness in the heart muscle and the occurrence of the athlete's lack of resistance and the appearance of fatigue. On the other hand, the tar substance in cigarettes increases blood thickness, causing narrowing of arteries and the occurrence of clots. Perhaps this explains the continuous panting of the smoker, his feeling of exhaustion, inability to exert effort in aerobic endurance, being physically unfit, and the rapid appearance of fatigue, which is the adverse and negative reflection on the athlete's performance due to the effects of smoking.

5. Conclusions and Recommendations

5-1 Conclusions: Statistically significant differences were found between smoking and non-smoking youth basketball players of Ramadi Club in aerobic endurance, the functional indicator Heart Rate (H.R), the functional indicator Systolic Pressure, and the functional indicator Diastolic Pressure, in favor of the non-



smokers. The results indicate the existence of a significant impact for athletes who practice smoking in the research variables as follows:

- The effect of smoking for smoking athletes in the physical variable (Aerobic Endurance) compared to non-smoking athletes was negative, with rapid appearance of fatigue due to nicotine and nicotine complications in cigarettes, causing weakness in the lung, respiration, and functional variables of the heart compared to non-smoking athletes.
- The effect of smoking for smoking athletes in the functional variable was high, with rapid heartbeats, and the pulse was almost abnormal due to smoking, unlike non-smoking athletes where the pulse was normal.
- The effect of smoking on blood pressure for smoking athletes was abnormal and somewhat elevated due to smoking, making the effect clear in practicing physical effort, unlike non-smoking athletes where it was normal.
- There are many negatives of smoking on the athlete's body and functional systems, as smoking has a significant impact on various body systems.
- Smoking increases the rate of heartbeats, blood pressure, and coagulation, and also reduces the capacity for aerobic endurance in sports exercises.

5-2 Recommendations:

The presentation of research results and their discussion, and the conclusions reached by the researcher, recommend the following:

- Necessity to conduct research and studies on the same physical variables and functional variables of the heart and similar studies, and the effect of smoking on sports training in individual and team sports games.
- Work on reformulating some legislations and laws in the sports field and activating them by banning the practice of the smoking phenomenon for athletes.
- Since smoking is a major cause of heart diseases and lung cancer in sports, we can save many athletes from smoking by placing a ban on smokers.
- Attention must be paid to the health of the basketball player being an athlete and reducing his consumption of cigarettes.

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Proximus Journal of Sports Science and Physical Education

Volume 3, Issue 03, March, 2026

<https://proximusjournal.com/index.php/PJSSPE>

ISSN (E): 2942-9943



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