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The effect of a proposed recreational sport program in improving measurements of overweight among the hearing impaired

Cheikh Safi [1] ; Hamsi billal[2]

[1 ;2] Physical and sports activity laboratory for children and adolescents, Mohamed Boudiaf - University of Oran, algeria,

[1]safieps@yahoo.fr ; [2]billal.hamsi@univ-usto.dz

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Corresponding author:

Hamsi billal,
e-mail:
billal.hamsi@univ-usto.dz

Abstract

This research aims to reveal the effect of a proposed sports program consisting of games of an entertaining nature on some morphological measurements indicating weight gain in people with hearing impaired. in this research, we relied on the experimental method because it suits the nature of the problem studied. this study was conducted at the Pedagogical Center for rehabilitation of the Hearing Impaired in Setif Province, aiming to evaluate the impact of a proposed recreational sports program. The research sample was chosen intentionally and consisted of 08 overweight students of both sexes. This research relied on measuring some morphological measurements: body mass index (BMI) and body fat mass(BFM). the In-Body H20N device was used as a tool to detect the morphological characteristics of the sample. the research concluded that the recreational exercise program has great effectiveness in improving the previously mentioned measurements.

I. Introduction

The phenomenon of overweight and obesity has increased in the past three decades among children and adolescents remarkably and has become one of the biggest health concerns that haunt those in charge of health around the world, overweight causing obesity negatively affects the efficiency of vital organs in the body in all groups, including adolescents, and raise their exposure to associated diseases such as blood pressure, imbalance of heart work, varicose veins, bone curvature... etc(Neslihan Koyuncuoğlu Güngör.2014).

Many studies and recent research in the medical field have confirmed that unhealthy and imbalanced dietary systems consumed by humans in our current era have had a negative impact on their health. these commercial food products targeted for consumption contain high levels of sugars, saturated and trans fats, which primarily led to an increase in obesity as a disease and weight gain as its starting point. this in turn has had a direct and indirect contribution to the development of fatal diseases such as heart disease, hypertension, diabetes and joint diseases, among others (Qadri Takiuddin. 2011).

It is scientifically established in our time that engaging in physical sports activities of all kinds has positive effects on the functioning of the body's vital functions, improving physique, and preventing diseases and disabilities (El hazza bin Muhammad El hazza. 2010).

The follower of this subject will find that many scientific studies and medical prescriptions encourage the practice of sports in various forms and types, and this is due to the latter's impact on the psychological, social, and physical aspects, especially the health, of all categories in general and the hearing impaired in particular (Bakshout, A., et al. 2019).

It is commonly known that adolescents in general, and those with hearing impairments in particular, experience the accumulation of fatty tissues in their bodies, similar to other healthy groups. this has necessitated the planning of sports programs that are suitable for their disabilities to find

effective solutions to address this health issue that threatens the health of their vital organs (Huanhuan H a, Kentaro Tomita. 2019).

Since recreation is a human right, individuals with hearing impairments are entitled to this right as they are human beings. those classified within this group have the right to utilize their free time engaging in recreational sports activities that are appropriate for their disabilities and take into account the specifics of their physical structure (Ismail Al-Qura, Marwan Ibrahim. 2010).

Given that hearing impairment hinders the affected individuals' ability to adapt to those around them, many of them tend to withdraw due to feelings of inadequacy or fear of being bullied by peers. this leads them to isolation and withdrawal at home or school, resulting in decreased physical activity. Consequently, their body morphology may change, making them more susceptible to weight gain and subsequently obesity. therefore, we propose a fun recreational sports program that could be one of the effective solutions to address this health issue, and this is what we aim to explore in this research through the following questions:

2. Research Questions:

2.1. General Question:

- Does the recreational sports program has an impact on measurements indicating weight gain for the hearing impaired?

2.2. Sub-questions:

To address the research problem, the researcher must answer the following sub-questions:

- Are there meaningful statistical differences between pre-test and post-test of body mass Index (BMI) metric attributed to the proposed recreational sports program?

- Are there meaningful statistical differences between pre-test and post-test of Body fat mass (BF%) metric percentage attributed to the proposed recreational sports program?

Importance of the Study:

Every study has its significance, part of which is evident from the underlying reasons for its selection, and another part relates to the scientific aspect and what this study offers in terms of interpretations and answers that serve scientific research and researchers in the field. therefore, the importance of our study can be outlined in the following points:

-To assess the reality of the participation of individuals with hearing impairments in recreational sports activities during their leisure time.

- To include this study in the university library to assist student researchers in the field of disabilities in general and specifically in the area of hearing impairments within the sports context.

-To utilize the results of this study in the future for the development and modification of recreational sports programs for individuals with hearing impairments.

dealing with this demographic group.

Research Terminology:

In this study, several terms have been mentioned that require clarification to simplify meanings and provide a clear picture for the reader. We present them as follows:

Recreational Sports Program:

-Terminologically: It refers to a set of sports activities of a recreational nature that are practiced during leisure time in an organized manner under the supervision of a recreational leader, aiming to achieve physical, health, moral, social, and psychological goals for its participants (Abdul Salam Muhammad. 2008).

- Operationally : It is a collection of units consisting of fun recreational activities of low to moderate intensity that are practiced during leisure time, characterized by low competition spirit and flexibility in practice, with the purpose of providing relief and bringing joy and happiness to its participants while enhancing physical and bodily aspects during practice.

Morphological Measurements :

-Terminologically : The term refers to a set of structural and compositional indicators of the body and its composition through precise measurements that determine body type and mass (Cissé Housseyni, Mimouni Nabila... , & al. 2024).

-Operationally : In this research, this term refers to the commonly recognized indicators for measuring overweight and obesity, represented by : Body Mass index (BMI) and Body Fat (BF%).

Overweight :

-Terminologically : According to the World Health Organization (WHO. 2022), overweight is defined as the result of dividing a person's weight in kilograms by the square of their height in centimeters, with the result falling between 25 and 29.9.

- Operationally : It refers to the accumulation of fat mass in the body above normal levels, which affects body shape and the performance of vital organs, negatively impacting overall health.

Hearing Impairments :

-Terminologically: Ali Abdul Nabi defines a hearing impaired person as someone who has lost the sense of hearing since birth and before learning to speak, or even after learning to speak, to a degree that does not allow them to respond naturally to educational or social purposes in the auditory environment except by using known communication methods: sign language, lip reading, finger spelling, and total communication (Saeed Kamal Abdul Hamid Al-Ghazali. 2011).

- Operationally: This refers to a segment of society whose members suffer from deficiencies or damage to the auditory sensory system or the neural area responsible for receiving and analyzing stimuli, leading to difficulties in verbal communication with others. this research targeted a sample of the hearing impaired aged between 17-21 years.

Previous studies:

- Study of **Nizar mouhamed, Al-Azouti Aladdin (2024) « The effect of a proposed recreational sports program on the body mass index (IMC) among schooled adolescents (15-18 years) ».**

This study examines the effectiveness of a proposed recreational sports program on the body mass index BMI among schooled adolescents (15-18 years), the sample consisted of 16 schoolchildren at Hadi Mahmoud High School, Tamlouka Municipality in Guelma, the researchers relied on the experimental approach by designing one sample, and the questionnaire was relied on to estimate the level of physical activity prepared by MARTIN 2000, And the body mass index BMI to classify individuals according to the standards of (IOTF), and a proposed recreational sports program was applied for a period of 10 weeks at a rate of 03 classes per week, and the dimensional results showed the effectiveness of the proposed program, and this is through the absence of any case that has physical inactivity, and 10 cases were recorded with a low level of physical activity represented by 62.5%, and 06 individuals were recorded with a moderate level of physical activity and represent 37.5%, and no case was recorded with a high level of physical activity, With regard to the body mass index BMI for the sample members, the researchers reached after the completion of the recreational program a noticeable improvement in the results by registering two individuals from the study sample classified in the category of obesity and representatives by 12.5%, and 13 individuals within the category of excess weight represented by 81.5%, and one case was recorded within the normal weight category represented by 6.25% of the study sample, and the arithmetic average of the body mass index BMI was 27.81 for the study sample, and it was recorded 23.86 as a minimum value. and 32.2 as the highest value of the BMI index for the study sample members.

- Study of **Bakshout Ahmed, and others...(2019) « The effect of the increase in the volume of physical and sports activities in the school environment on the percentage of fat in the body and some physiological variables among male adolescents at the age of (16.18)** ».

This research aimed to determine the effect of the increase in the volume of physical and sports activities in the school environment on the percentage of fat in the body and some physiological variables in adolescents males at the age of 16-18 years. the researchers relied on the

experimental approach and a research sample was deliberately selected with a number of 71 students (males), schoolchildren in the secondary stage, they were selected after informing them and obtaining written consent, the control sample practiced physical education and sports lesson once a week for 10 weeks, where the researchers divided the sample into two control and experimental groups randomly., anaerobic capacity by the Sargent test and retrieval capacity by the (Ruvier) index. the arithmetic mean, standard deviation, test "T" for the both correlated samples (pre-post), test "T" for the two independent samples (post-post), and simple correlation coefficient Pearson were calculated. After the results were released, the researchers found that the percentage of body fat increased in both samples and to a lesser extent in the experimental sample. they observed the development of D in the maximum oxygen consumption in favor of the experimental sample with relative stability in the control sample, a development was observed in the anaerobic capacity of the two samples but to a greater extent in the experimental sample. For retrieval capacity, the statistical analysis showed significance in the level of the experimental group. there is an inverse correlation between the percentage of fat in the body and some physiological variables under study.

Methodological Procedures of the Study:

Research Method :

Given the specificities of our study, we found that the most suitable scientific method to achieve accurate results is to rely on the experimental method by following a one-group design subjected to pre-test and post-test.

In this research, the experimental design before/after of one single group was relied upon for the following reasons:

- The before/after design of one group is awarded to measure changes within the same individual or group before and after the intervention, minimizing the impact of individual variables that may affect outcomes.
- If the study is preliminary, the research can later be expanded to include a control and experimental group to obtain more reliable conclusions and this is what our study is based on.

- This design is adopted in studies that require specialized equipment or expensive laboratory tests as an IN-BODY device, so the design is relied on before/after with a small sample to reduce costs and time required to conduct research.
- The small sample size allows for a more accurate study of the problem for each individual, which can provide additional qualitative data on how individuals respond to the intervention (Patton, M. Q. 2015 :347).

Exploratory Study:

On January 14, 2024, we visited the Center for hearing impairment rehabilitation in Setif, Algeria. we got to know the staff at the center and reviewed the medical records to understand the instructors and students attending the center. they identified a sample of 12 individuals suffering from obesity, from which 8 were selected as the study sample, while 4 were isolated as an exploratory sample. We conducted some recreational sports activities to simulate the recreational sports program in order to assess the responses of these individuals to those activities, as well as to determine the appropriate times for implementing the recreational program and to select suitable sports equipment and tools for the planned recreational units.

Research Population and Sample:

1. Research Population:

The population of this study consists of individuals with hearing impairments who are undergoing rehabilitation at the specialized pedagogical center for the care and rehabilitation of hearing impaired individuals, with a total population of approximately 41 students.

2. Research Sample:

After conducting the exploratory study at the specialized educational center for the rehabilitation of the hearing impaired(secondary stage) between the ages of 17 and 21 years and their hearing disabilities are limited to 70 to 120 decibels, 17 students of both sexes were detected with high levels of excess weight indicators, a group of students was selected intentionally consisting of 08 students distributed equally between females and males and we excluded 09 students because they are involved in local

sports clubs and were isolated from the search in order to preserve credibility of the results. the small sample size was intentionally chosen to ensure precise experimental control and facilitate comprehensive monitoring of individual responses to the program.

Areas and Limits of the Study:

- Spatial Area: The study was conducted at the specialized pedagogical center for the care and rehabilitation of hearing impaired individuals.

- Temporal Area:

A: The first phase: The exploratory study was conducted from December 10, 2023, to December 20, 2023.

B: The main study:

- Date of pre-measurements: 10/01/2023.

-Duration of the proposed sports program: From 12/01/2023 to 09/03/2023.

- Date of post-measurements at :13/03/2023.

Study variables:

The variables of the research we are working on are as follows:

A: Independent variable:

- The proposed recreational sports program.

B: Dependent Variables:

- Overweight, hearing impairments.

C: Experimental control (control of variables):

Data Collection Tools:

- The InBody H20N device was used, which is one of the most reliable devices in the world for body measurements and morphological assessments of the human body: Body Mass Index (BMI), body mass, and body fat percentage (BF%).

- Medical height measuring board.

Based on the results obtained, the recreational sports program was developed and adapted according to the scientific principles and theories related to intensity, duration of the recreational unit, frequency,

Scientific foundations of the Tests:

Verification of the InBody-H20N device and medical height measuring Tape:

Regarding the devices from InBody and the medical height measuring tape; these are laboratory and technological tools that have been verified for their credibility by experts and have been used in previous studies, so there is no need to verify their credibility in our study (Foulah Mohammed et al. 2023).

The psychometric properties of Body mass and Fat mass Index:

Table (01): The validity and consistency coefficients of Body mass(BMI)

scaling	Unit of measur-ement	Pre-measurement		Measurement after		stability	Validity
Body mass	BMI	Arithmeti-c mean	Standard deviation	Arithmeti-c mean	Standard deviation		
		25.30	1.95	25.08	02	0.98	0.99

Source: Preparing researchers based on SPSS program

From table (01) we observe that the reliability and intrinsic validity coefficients for the body fat index (BMI) are high, with a reliability value of 0.99 and an intrinsic validity value of 0.99. this indicates the validity and reliability of the body fat index measurement.

Table (02): The validity and consistency coefficients of body fat mass (BF%)

scaling	Unit of measur-ement	Pre-measurement		Measurement after		stability	Validity
Body fat mass	BF(%)	Arithmeti-c mean	Standard deviation	Arithmeti-c mean	Standard deviation		
		16.78	0.49	16.70	0.47	0.99	0.99

Source: Preparing researchers based on SPSS program

From table (02) we observe that the reliability and intrinsic validity coefficients for the body fat index are high, with a reliability value of 0.99 and an intrinsic validity value of 0.99. this indicates the accuracy and consistency of the body fat index measurement.

Sample Homogeneity:

Homogeneity among the sample members is verified before starting the implementation of the program, based on controlling the variables: height, weight, and age.

Table (03): Statistical significance and torsion coefficients for the basic variables of the Sample (homogeneity)

Variables	Unit	Arithmetic mean	Arithmetic median	Standard deviation	Torsion coefficient
Length	cm	178.5	179.0	4.55	-0.47
Weight	kg	70.02	68.70	3.44	+0.45
Age	year	19	20	2.12	-0.42

It is evident from table (03) that the shear modulus values for the study sample in the basic variables have been confined between (+0.45/0.42-) all this proves the consistency of the sample to a large extent.

Scientific foundations on which the program is built:

This recreational program is built on a set of foundations:

-Taking into account the scientific foundations in the development of recognized sports programs.

- Explanation of the recreational program of the sample under study.

- Gradient load in terms of: intensity, load, number of repetitions, intensity.

- Presenting the general objectives of the program and explaining the objective of each unit.

-Focus on the spirit of recreation during the application of units and integrate fun and interesting competition during performance.

- Diversifying activities within the unit and diversifying them between units to avoid boredom.

- Making the most of the structures and sports equipment in the pedagogical center.

A: **Program design**: After reviewing the books and scientific articles that dealt with the subject of preparing programs for weight loss and related diets, we have prepared a recreational sports program for a period of (08) weeks, each week consists of (03) recreational sports units (Sunday, Tuesday, Thursday) of each unit (60) minutes conducted at the time (15.00-16.00).

Table (04): Shows the time and number of units of the recreational sports program

01	Program Duration	08 weeks
02	Total number of recreational sports units	02 Units
03	Number of units in week	03 Units
04	time of one unit	60 min
05	Overall units in week	03 hours
06	Total time of recreational units in the program	72 hours

B: **The intensity of the program**:

The fact that the sports program to be applied is recreational, as it has a load and intensity of the activity or game and its repetition is moderate, unlike the training programs, and based on previous studies and research, the intensity was divided as follows:

table (05): Shows the distribution of load intensity during the stages of the program

////	weeks	Load and intensity	Number of activities in the unit	Repeat Activity/Game
01	01-02	65% - 70%	02	02 times
02	02-04	70 % - 75%	02	02 times
03	04-06	75 % - 80%	02	02 times
04	06-08	80% - 85%	02	02 times

C: **The division of time within the recreational unit**:

Based on what has been mentioned previously and after taking an overview of the nature of the content and foundations of building the

recreational sports program through in-depth reading from the mentioned scientific sources and taking the opinion of specialists in the field, the recreational sports program, including its component units, was structured as follows:

- Preparatory stage:

In which the attendance is recorded, the dress is verified, and the goal of the unit is explained, after which the practitioners are prepared psychologically, mentally, physically for a period of (15 minutes).

- Basic (Executive):

It consists in conducting motor duties and recreational semi-sports games that serve the goal set for the unit, taking into account the abilities and tendencies of the hearing impaired in an estimated period of time (40 minutes).

- Closing stage:

During which the return to calm and relaxation and restore the work of vital organs to the normal state in an atmosphere of fun and satisfaction and a time frame of (05 minutes).

D **: <u>The activities and sports that make up the proposed recreational program</u> :**

A group of recreational sports activities were selected in proportion to the capabilities available in the center, and the recreational sports program was presented to a group of experts who expressed their positive opinion about its content on its component activities. the variety in the form of games has been taken into account based on the following**:**

- Semi sports games with and without tools.
- Sports activities by groups and individual.
- Fun competitive games and activities
- Aerobic and anaerobic sports and games activities.
- Reliance on games and physical activities that are communicated through visual cues.
- Active heart rate should be limited to: 110-140 R/M

15. Statistical methods: In this study, the results were based on the following:

- Arithmetic mean: The arithmetic mean is the most used in such research.

- Standard deviation: It is one of the most important measures of dispersion as the most accurate.

- We relied in this research on: T - student test (T- test) for one sample with a pre- and post-measurement.

- Statistical package program for social sciences SPSS22.

-Calculating the Eta-squared coefficient (η^2) using SPSS program, which is used to measure the size of the effect in analyzing the variance caused by the recreational sports program on both body mass index (BMI) and body fat percentage (BF%) using the equation:

$$\text{Eta}^2\ (\eta^2) = \text{SSeffect} / \text{SStotal}$$

- SSeffect: sum of squares attributable to the effect of the independent variable.

- SStotal: total sum of squares in the model.

16. Presentation and results analysis:

16.1. Presentation and analysis of the first partial hypothesis:

- There are meaningful statistical differences between pre-test and post-test metrics of body mass Index (BMI) attributed to the proposed recreational sports program.

Table (06): the differences between the pre- and post-measurements of metrics of body mass (BMI)

scaling	Unit of measurement	Pre-measurement		Measurement after		-T-TEST	η^2	Statisti-cal sig
		Arithmeti-c mean	Standard deviation	Arithmeti-c mean	Standard deviation			
Body mass	BMI	25.73	2.10	25.07	2.07	0.00	0.99	Indicate

Source: Preparing researchers based on SPSS program

Through table (06) it shows us thatit can be observed that the mean value of the experimental sample's body mass index (BMI) in the pre-test measurement was 25.73 with a standard deviation of 2.10, while the mean value in the post-test measurement was 25.07 with a standard deviation of 2.07.It is also noted that the significance value (sig) between the pre-test and post-test BMI measurements is 0.00, which is less than the error margin of 0.05. this indicates the presence of statistically significant differences between the pre-test and post-test BMI results, favoring the post-test measurement, as its mean value (25.07) is lower than that of the pre-test (25.73). these differences were scientifically confirmed through the effect size (Eta-squared), which was 0.99 for BMI, a value indicating a substantial impact of the proposed recreational program in reducing body mass among the experimental sample.

Presentation and analysis of the second partial hypothesis:

-There are statistically significant differences between the pre- and post-measurement in the body fat mass index attributed to the proposed recreational sports program.

Table (07): Significance of the differences between pre- and post-measurements in the metrics t of fat mass (BF%)

scaling	Unit of measurement	Pre-measurement		Measurement after		-T-TEST	η^2	Statistical sig
Body fat mass	BFM%	Arithmeti-c mean	Standard deviation	Arithmeti-c mean	Standard deviation			
		17.07	1.69	15.95	2.11	0.02	0.91	**Indicate**

Source: Preparing researchers based on SPSS program

From the table (07) it shows us thatit can be observed that the mean value of the experimental sample's body fat index in the pre-test measurement was 17.07 with a standard deviation of 1.69, while the mean value in the post-test measurement was 15.95 with a standard deviation of 2.11.Additionally, it is noted that the significance value (sig) between the pre-test and post-test body fat measurements is 0.02, which is less than the error margin of 0.05. this indicates the presence of statistically significant differences between the pre-test and post-test body fat results, favoring the post-test measurement, as its mean value 15.95 is lower than that of the pre-test 17.07. these differences were scientifically confirmed through the effect size (Eta-squared η^2), which was 0.91 for body fat, a value indicating a substantial impact of the proposed recreational program in reducing body fat among the experimental sample.

Discussion and interpretation of results:

- Discussion of the general hypothesis: discussion of The general hypothesis **« The recreational sports program has an impact on measurements indicating weight gain for the hearingimpaired».**After the results were issued, We found Through table (06) it shows us thatit can be observed that the mean value of the experimental sample's Body Mass Index (BMI) in the pre-test measurement was 25.73 with a standard deviation of 2.10, while the mean value in the post-test measurement was 25.07 with a standard deviation of 2.07.it is also noted that the significance

value (sig) between the pre-test and post-test (BMI) measurements is 0.000, which is less than the error margin of 0.05. this indicates the presence of statistically significant differences between the pre-test and post-test BMI results, favoring the post-test measurement, as its mean value 25.07 is lower than that of the pre-test 25.73. these differences were scientifically confirmed through the effect size (Eta-squared η^2), which was 0.99 for (BMI), a value indicating a substantial impact of the proposed recreational program in reducing body mass among the experimental sample and from the table (07) it shows us thatit can be observed that the mean value of the experimental sample's body fat index in the pre-test measurement was 17.07 with a standard deviation of 1.69, while the mean value in the post-test measurement was 15.95 with a standard deviation of 2.11.Additionally, it is noted that the significance value (sig) between the pre-test and post-test body fat measurements is 0.02, which is less than the error margin of 0.05. This indicates the presence of statistically significant differences between the pre-test and post-test body fat mass (BF%) results, favoring the post-test measurement, as its mean value (15.95) is lower than that of the pre-test (17.07). these differences were scientifically confirmed through the effect size (Eta-squared η^2), which was 0.91 for body fat mass(BFM%), a value indicating a substantial impact of the proposed recreational program in reducing body fat among the experimental sample from all of this, we conclude thatthe proposed recreational sports program has an effective impact on reducing body mass index (BMI) and body fat mass (BFM), this is what previous studies have found that have dealt with this topic as a study of: **Al-Azouti Aladdin's study** (**2021**), entitled "A study of the relationship of body style (overweight and obesity) with the level of physical activity among students attending secondary schools in the state of Guelma (15-18 years)", and the results showed a statistically significant relationship between the level of physical activity (physical inactivity), body mass index and body circumference, from this presentation and analysis, besides this study, we findt he effectiveness of the educational sporting activity has confirmed in reducing obesity levels and weight gain studyof: **Learmonth, Y. C., & H, J., & al. (2019)** entitled "Physical education and leisure-time

sport reduce overweight and obesity: A number needed to treat analysis", the results of this study concluded that the activities and recreational games practice in the school environment have a positive and significant impact on weight and obesity levels, from all this we conclude that the hypothesis is confirmed.

- Discussion of the first partial hypothesis : discussion of the partial hypothesis **« There are meaningful statistical differences between pre-test and post-test of body mass Index (BMI) metric attributed to the proposed recreational sports program ».**

From the table (06) it shows us thatit can be observed that the mean value of the experimental sample's body mass index (BMI) in the pre-test measurement was 25.73 with a standard deviation of 2.10, while the mean value in the post-test measurement was 25.07 with a standard deviation of 2.07.It is also noted that the significance value (sig) between the pre-test and post-test (BMI) measurements is 0.00, which is less than the error margin of 0.05. This indicates the presence of statistically significant differences between the pre-test and post-test (BMI) results, favoring the post-test measurement, as its mean value (25.07) is lower than that of the pre-test (25.73). These differences were scientifically confirmed through the effect size (Eta-squared η^2), which was 0.99 for (BMI), a value indicating a substantial impact of the proposed recreational program in reducing body mass among the experimental sample, from all of this, we conclude thatthe proposed recreational sports program has an effective impact on reducing body mass index (BMI), this is what previous studies have found that have dealt with this topic as a study of: **Nizar Mohamed, Al-Azouti and Aladdin (2024)**, entitled "The effect of a proposed recreational sports program on the body mass index (BMI) among schooled adolescents (15-18 years)", where the study concluded that the proposed recreational sports program has a significant impact on improving the body mass index among adolescents (15-18). many studies have also confirmed the results our research such as a study of:: **Zan Huang, Gang Sun, Jiayu Li,…. & al (2025)** , entitled : "Optimal exercise dose on Body Mass Index (BMI) in

children and adolescents with overweight and obesity: a systematic review and bayesian model based network meta analysis", this study used sport exercise on a wide range of samples in order to know the effect of these activities on body mass index and obesity in children and adolescents, and this research found that the sports activities and programs consisting of various exercises positively affect the body mass index and contribute to reducing its levels. From all this we conclude that the hypothesis is confirmed.

- Discussion of the second partial hypothesis :

Discussion of the partial hypothesis **« There are meaningful statistical differences between pre-test and post-test Body Fat Mass (BFM%) metric percentage attributed to the proposed recreational sports program** ». From the table (07) it shows us thatit can be observed that the mean value of the experimental sample's body fat index in the pre-test measurement was 17.07 with a standard deviation of 1.69, while the mean value in the post-test measurement was 15.95 with a standard deviation of 2.11. Additionally, it is noted that the significance value (sig) between the pre-test and post-test body fat measurements is 0.02, which is less than the error margin of 0.05. This indicates the presence of statistically significant differences between the pre-test and post-test body fat results, favoring the post-test measurement, as its mean value (15.95) is lower than that of the pre-test (17.07). these differences were scientifically confirmed through the effect size (Eta-squared η^2), which was 0.91 for body fat mass (BFM%), a value indicating a substantial impact of the proposed recreational program in reducing body fat among the experimental sample from all of this, we conclude thatthe proposed recreational sports program has an effective impact on reducing and body fat mass (BF%), this is what previous studies have found that have dealt with this topic as a study of: **Bakshout Ahmed,. & al. (2019).** it entitled:"The effect of the increase in the volume of physical and sports activities in the school environment on the percentage of fat in the body and some physiological variables among male adolescents at the age of (16.18) An experimental study on students of Shehan High School on the state of Chlef" and the study concluded that the proposed sports program led to a reduction in the percentage of fat in the body by 9, 63% for males and 9.84% for females, we also find many studies that have reached the same results of our research as this study of: **Amare, F, Alemu, Y,…& al.**

(2024). it itled:"Effects of aerobic, resistance, and combined exercise training on body fat and glucolipid metabolism in inactive middle-aged adults with overweight or obesity: A randomized trial",this study found that aerobic sports activities and associated exercise clearly affect body fat mass and contribute to the burning of blood glusides that cause fat accumulation. After all this presentation and analysis, we concluded that the hypothesis has been fulfilled.

Conclusion :

The recreational sports activities are one of the types of physical activity that attracts many groups because it contains games and optional exercises free of high physical effort and are free from intense competition, this is what makes it suitable for the needs of these because it is in line with their tendencies and desires, and the fact that this type of sports activities is practiced in leisure time made it more in demand in our time, and in this research one of the most important goals of sports was reviewed, which is to improve the health aspects of practitioners, especially with regard to With weight gain and ghee, which have become problems of sticking, and from this has been the application of a proposed recreational sports program on the category of the hearing impaired (17-21 years) to study the effects of this sports pattern on the indicators associated with their weight gain, after the application of the program and analysis of the results based on the pre-formulated hypotheses it was concluded that the recreational sports program has positively affected the improvement of the morphological indicators associated with overweight, represented in: Body mass index and fat percentage.

Recommendations and suggestions :

At the end of this research, the researchers in charge of it concluded to write down several recommendations for the latter, summarized as follows :

- Urging doctors and those in charge of treating weight disorders and obesity to practice recreational sports activity.

- Training teachers specialized in recreational sports activities capable of building health programs in this type of sport.
- Urging those in charge of sports activities to encourage the establishment of recreational sports programs to serve public health
- Acknowledging researchers and academics in the sports field to direct their research to the study of recreational sports activity of all kinds.
- Holding and promoting sports events of a recreational nature.

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