

Comparison of energy expenditure, metabolic rate, and MVPA during the (Zumba class) among normal-weight, overweight and obese adult women.

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Abstract

The purpose of this paper is to compare energy expenditure, metabolic rate, and MVPA during the (Zumba class) among normal-weight, overweight and obese adult women. The researchers used the descriptive method in a comparative method to solve this problem. The sample consisted of a group of adult female participants who were chosen by the intentional method, as the number of the sample was (42) of the new female participants (first and second week) representing (34.4%) of the original population represented by (112) participants in the women's gymnasium. One of the most important results reached by the researcher is that: The processes of energy exchange and metabolism differ from one body to another in the same type of activity practiced if the body weights and structures are different, the number of steps is different in the research groups, despite the use of the same training sessions, and this indicates differences in capabilities, and it is wrong to use the same pace and quotas for Zumba sessions for all weights without allocating appropriate sessions for each category and according to the body mass index. One of the most important recommendations recommended by the researchers is that: to achieve the best desired objectives of the Zumba classes and sessions, regulated classes must be used that are proportional to the different body weights, taking into account the differences between the participants, and not to involve all the various weights in the Zumba sessions and allocate special sessions at an appropriate pace for each group of weights that are classified according to the body mass index (BMI).

Introduction:

Sports is one of the effective weapons for losing weight, and it is the most appropriate way to gain a graceful body and maintain sound health. The muscle is twisted at a record speed, and every woman wants to get rid of the accumulated fat and lose weight to reach the body's optimal image. The daily living reality of men's and women's clubs and gyms is full of mistakes and abuses, some of which are done consciously and some of which are done unconsciously, including what happens due to the lack of conscience of those who have been entrusted with the responsibility of training and they are not qualified or indifferent, which puts them in the category of perpetrators of different transgressions than before. Insisting against the bodies of people they trusted, so you find someone who uses the leather belt around the abdomen incorrectly, or carries more weights than he can or does not practice the necessary warm-up exercises or exercises that stretch the necessary muscles, and you find women who are satisfied with machines without free exercises, or they follow an intensive program of endurance exercises, so that their body and muscles after a period become similar to the body of a man, and their strength loses a large part of his femininity, and they find a number of trainees are not guided by the trainer's instructions about the order of the exercises they do, whether they are endurance exercises or light exercises, or even whichever one they start with. The biggest problem is the arrangement of the classes, their quality for the participants and their intensity, which includes all without specifying or calibrating the quality of the body and the amount of weight for each person and each gender. Metabolic rates differ from one person to another according to gender, age, weight, and even the amount of energy expended, so the amount of training intensity (MVPA) will vary from one practitioner to another. One of the methods that are used recently in gyms is the Zumba class, which is a different type of sport, where the Zumba dance exercises are more than just an exercise, which is what made Zumba recently very popular in all countries of the world, and Zumba exercises have become one of the most famous group exercises in the world that can be done at different times and in a variety of places, but each session is a class and according to the person and his health and physical condition.

Research problem:

The researchers noticed that because they are fitness trainers in the gyms, most gyms give Zumba sessions at the same intensity to all participants without taking into account the weight and the amount of fat accumulated for each participant, so individual differences must be taken into account in order to obtain the best results and the best rates of expended energy and metabolism for weight loss. That is why the researcher decided to compare the energy expenditure, metabolic rate and (MVPA)

during one Zumba sessions between three categories of adult women who have normal weight and overweight and obesity to identify the appropriateness of sessions for each of the categories and what is the amount of effort And the energy spent in Zumba sessions.

Research objective:

- Comparison of energy expenditure, metabolic rate, and MVPA during the (Zumba class) among normal-weight, overweight and obese adult women

Research methodology and field procedures:

Research Methodology:

The nature of the problem is what determines the method that the researcher chooses for the purpose of arriving at the results. As many phenomena can only be studied through a method appropriate to the problem to be discussed, so the descriptive approach was used in a comparative method to solve this problem.

Community and sample research:

The sample consisted of a group of adult female participants who were chosen by the intentional method, as the number of the sample was (42) of the new female participants (first and second week) representing (34.4%) of the original population represented by (112) participants in the women’s gymnasium titanium. The sample was divided and classified into three groups after measuring the weight and extracting the body mass index (BMI) and they were as follows:

Table (1) shows the sample description

Category	Number	BMI
Normal weight	11	24.9 - 18.5
Overweight	18	29.9 - 25
Obesity	13	>30

Devices, tools and means used in the research:

- 4 German-made SenseWear Armbands to measure metabolic rate, energy expenditure and number of steps.
- 1 electronic stopwatch.
- Medical scale, type Huawei, number 1.
- 1 tape measure.
- 1hp laptop.
- DJ 1 to play music.

Means of collecting information:

- Arabic and foreign sources and references
- Information dump form.
- Personal interviews.
- Assistive work team.
- Test and measurement.

Identify search variables:

It was determined (energy expenditure), (metabolic rate) and (MVPA) as these variables are the most important to determine the differences and the most appropriate for the reality of our study.

Tests

1- Weight measurement test (Mahdi, 2011):

The weight is measured to the nearest (100) g (0.1) kg by means of the scale and the measurement is done without shoes and with the least clothes possible on the body of the examinee, taking into account that the scale is not placed on soft ground when the measurement process is carried out

2- Body Mass Index (BMI) test (Subhi, 2007, p. 65):

It is measured by the body mass index, which is calculated from the following equation:

$$BMI = \text{weight} \div (\text{length (m)} \times \text{length (m)}).$$

Description of the device used in the search:

SenseWear Armband:

The Sensewear is a medical device that is used to record the exact calorie consumption throughout the day and the exact data can then be read using specially developed software with this information, moreover the Sensewear bracelet records the length and depth of sleep and calculates the steps The special thing about this bracelet is that it can track the period Exactly this physical stress

makes it possible to know how many calories your training session has burned, the Sensewear bracelet is very easy to use and very comfortable to wear and its shape is very thin and weighs only 45 grams, so portability is ensured and therefore the bracelet can be easily and comfortably worn under clothes all day, even during heavy loads. This means that it can be worn for approximately 24 hours. The big advantage of this is that data collection can be done all the time the Sensewear bracelet should only be removed for showering. The Sensewear bracelet measures a variety of different data for optimal recording to be worn on the triceps muscle in the right upper arm. These various data include for example:

- Skin temperature
- Heat flow
- Skin conductivity
- hugging body temperature
- Two-axis accelerometer

A large number of variables are determined from these physiological signals measured using the special software and these include for example total energy turnover per day (kcal) active energy turnover as well as basal metabolism and rest. In addition to this the duration of physical activities and MVPA is measured, as well as the exact time you sleep and lie down to the minute results in a movement chart that provides information about your movement behavior.

Exploratory experiences:

The researchers conducted several exploratory experiments before starting work to ensure that the devices worked. There were two exploratory experiments for Zumba sessions with Sensewear and for tests on the two days, Tuesday 17/12/2019 and Wednesday 18/12/2019, the aim of which was:

- Ensure that all devices are working properly.
- Knowing how long the devices battery works and how much time it spends on charging.
- Ensuring the adequacy of the auxiliary work team and their work mechanism during the sessions.

In addition, an exploratory experiment was conducted on the selected tests before they were conducted on Thursday, 19/1/2019, in order to know the difficulties and obstacles that the researcher will face during the main experiment.

Field research procedures

Main experience:

The assistant work team, after conducting the exploratory experiments, defining the categories of the sample members and dividing the totals after extracting the weight, height and body mass index for all the participants. The arrival of all participants on one day and at the same time, and it was spread over 8 days, all in January and on the dates (8/9/11/13/14/16/20/27) of January, and the procedures were as follows:

- The measurement tests were started from 8/1/2020 to 27/1/2020.
- The sample was classified into three levels according to the body mass index (BMI).
- The sample was from the new participants in the first and second week of them in the hall and the sessions, and the participants who continued for more than three weeks were excluded.
- Zumba classes were given two days a week for each participant.
- The times for the measurement sessions were from 2:00 pm to 5:00 pm.
- The duration of the Zumba sessions used in the hall was recorded at 45 minutes per session.
- Sensewear belts were placed for the sample members 2 minutes before the start of the session.
- The same Zumba sessions were used for the different members of the sample and all the distributed groups without any increase or decrease in intensity or time by the responsible trainer.
- The required variables from the iPad were determined (energy spent in calories / metabolic rate / MVPA / number of steps) for all sample members.
- After the sessions ended, the data was unloaded into the data registration forms for each member of the sample.

Statistical methods: The search data was processed through the Statistical Package for the Social Sciences (SPSS).

Results and discussion:

Table (2) shows the arithmetic mean and standard deviation in the variables for the normal weight group

Variables	Measuring	Arithmetic mean	Standard deviation
Mvba	% Intensity	61.49	4.492
Metabolism	met	4.68	0.639
Expended energy	cal	3440.81	382.13
Number of steps	Count	5922.90	317.26

Table (3) shows the arithmetic mean and standard deviation in the variables for the overweight group

Variables	Measuring	Arithmetic mean	Standard deviation
Mvba	% Intensity	62.98	4.522
Metabolism	Met	3.26	0.503
Expended energy	Cal	2698.88	290.19
Number of steps	Count	4323.33	462.09

Table (4) shows the mean and standard deviation of the variables for the obesity group

Variables	Measuring	Arithmetic mean	Standard deviation
Mvba	% Intensity	71.56	3.464
Metabolism	Met	2.07	0.399
Expended energy	Cal	2004.23	303.64
Number of steps	Count	3046.53	489.54

Table (5) shows the results of the analysis of variance F test and the sum of squares between and within groups for the three research groups.

Tests		sum of squares	mean squares	Value F	Level sig	Type sig
Mvba	Between groups	765.659	382.830	21.529	0.000	sig
	Within groups	693.516	17.782			
Metabolism	Between groups	40.832	20.416	77.166	0.000	sig
	Within groups	10.318	0.265			
Expended energy	Between groups	12310204.754	6155102.37	60.038	0.000	sig
	Within groups	3998307.722	102520.711			
Number of steps	Between groups	49314068.646	24657034.323	128.004	0.000	sig
	Within groups	7512448.140	192626.875			

Significant when the significance value ≤ 0.05 under degree of freedom of 41

Table (6) shows the results of the LSD test for the comparison between the three groups of variables that showed significant differences.

Tests	groups	Arithmetic mean	group	Arithmetic mean	arithmetic mean of difference	Level sig	Type sig	Preference
Mvba	Normalweight1	61.49	Overweight2	62.98	1.49207-	0.361	Non sig	Obesity group
	Normal weight1	61.49	Obesity3	71.56	10.06972	0.000	sig	
	Overweight2	62.98	Obesity3	71.56	8.57765-	0.000	sig	
Metabolism	Normal weight1	4.68	Overweight2	3.26	1.42088	0.000	sig	Normal weight
	Normal weight1	4.68	Obesity 3	2.07	2.61781	0.000	sig	
	Overweight2	3.26	Obesity 3	2.07	1.19693	0.000	sig	
Expended energy	Normal weight1	3440.81	Overweight2	2698.88	741.92929	0.000	sig	Normal weight

	Normal weight1	3440.81	Obesity 3	2004.23	1436.5874	0.000	sig	
	Overweight2	2698.88	Obesity 3	2004.23	694.65812	0.000	sig	
Number of steps	Normal weight1	5922.90	Overweight2	4323.33	1599.5757	0.000	sig	Normal weight
	Normal weight1	5922.90	Obesity 3	3046.53	2876.3706	0.000	sig	
	Overweight2	4323.33	Obesity 3	3046.53	1276.7948	0.000	sig	

Significant when the significance value ≤ 0.05

Discussion:

Through the results, it became clear that there are significant differences between the variables investigated, and that is perhaps the logical explanation for the difference in the nature of body weight from one group to another, which showed significant differences in all the variables that indicate the presence of differences in the investigated aspects. Mvba) for the groups that the intensity rates showed clear significant differences between the groups, especially the obesity group, which was in Table (6) of the LSD to indicate the preference in favor of those who were for the obesity group, which is explained by the fact that the intensity of the training session was somewhat very high for this group of weight, which made their (Mvba) rates high due to the rapid and high heart rate rise because the high effort did not adapt to the circulatory system, so the obese group became in high intensity compared to the two previous groups, followed by a lesser percentage of the overweight group and then the normal weight, which was The practiced activity is appropriate for them and within the good intensity that achieves the objectives assigned to the Zumba class, and this thus indicates that the classes were of high intensity for the obese group compared with the other two groups. But if we notice through Table (5) for the metabolic variable, if there are differences in terms of metabolic processes, as they appeared in varying proportions between the groups, and the preference was according to Table (6) in favor of the normal weight group, and this may be self-evident because the body that has More muscle and less fat. It has a higher ability to metabolize to generate calories to be burned. Therefore, the overweight and obese groups were less effective in the metabolism process during Zumba sessions and classes. This is what Saleh Saad stated, "Each pound of muscle uses about 6 calories per day just to maintain itself, while each pound of fat burns only two calories per day" (Bashir. 2011).

As for the energy spent, it is related to metabolic processes, and if we observe Table (5), we note that the normal weight group was the most expended on energy (calories) within an hour of the Zumba class, and this is the most appropriate thing for them to obtain the desired benefit, but if we notice the two groups that are overweight or obese, they are Less energy expenditure, especially the total obesity compared to the normal weight group, due to the difference in body weight, the amount of fat accumulated in the body, the quality of the portion and the training sessions. The normal weight, and this indicates that the quota was not appropriate for all weights in achieving the desired goals inside the gyms for women. "The calories consumed in sports performance are not considered constant for any part, but differ from one individual to another. Rather, they differ from the individual himself in relation to the difference in his body weight, the type of performance, training, and the time for such performance, and differ from one activity to another suitable for each individual" (Al-Hauri. 2011).

Finally, the number of steps that were implemented during the full hour of Zumba classes, if we observe Table (5), we find that the differences are significant between the groups in favor of the normal weight group with large differences from the two groups, especially the obesity group. The normal and obesity in the steps was 2,300 steps, and this is a large number and indicates that the ability and potential of the groups vary during the same applied classes, if the intensity of the exercises was high and it appeared that the stress outweighed the obesity group. As for the metabolic variables and the energy spent, the preference was for the normal weight group and this It indicates that the quality of the classes was appropriate and appropriate to achieve the important goals, whether spending energy to maintain normal weight, burning excess fat, metabolism, calorie restriction, and even the number of steps taken by the groups was shown comfortably for the natural weight group that was taking the largest number of steps smoothly during the classes. The best goals are achieved during the Zumba sessions.

Conclusions and Recommendations:

Conclusions:

The researchers concluded the following:

- The processes of energy exchange and metabolism differ from one body to another in the same type of activity practiced if the body weights and structures are different.
- The number of steps is different in the research groups, despite the use of the same training sessions, and this indicates differences in capabilities.
- It is wrong to use the same pace and quotas for Zumba sessions for all weights without allocating appropriate sessions for each category and according to the body mass index.

Recommendations:

- To achieve the best desired objectives of the Zumba classes and sessions, regulated classes must be used that are proportional to the different body weights, taking into account the differences between the participants.
- Not to involve all the various weights in the Zumba sessions and allocate special sessions at an appropriate pace for each group of weights that are classified according to the body mass index (BMI)

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