EFFECT OF DIETARY MEAL PLAN ON ANTHROPOMETRIC AND PHYSIOLOGICAL INDICES AMONG OVERWEIGHT WOMEN PRACTICING ZUMBA

NURATHIRAH BINTI ABD MU'AS

UNIVERSITI PENDIDIKAN SULTAN IDRIS

2022

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ABSTRACT

The aim of this study was to investigate the effects of dietary meal plan on anthropometric andphysiological indices such as body weight, Body Mass Index (BMI), waist and hip circumferences, percentage of fat and blood pressure among overweight women practicing Zumba. The participants consisted of 20 overweight women who wereaged 18 until 55 years old, which were not involved in weight loss program, not onmedication, did not have any chronic diseases and did not consume any weight losssupplement or meal replacement. Body weight, BMI, waist circumference, hip circumference, percentage of fatand diastolic and systolic blood pressure were measured at the end week 1, week 4 and week8. Zumba exercise together with dietary meal plan interventions were given to all participants and the data were collected by using 24-hours diet recall and 3-days diet record. The effects of Zumba exercise with applied meal plan were analyzed by using one-way repeated measures MANOVA. The resultsshowedthatZumba exercise combined with dietary meal plan showed a significant different in body weight ($p<.001$), BMI ($p<.001$), hip circumference ($p<.001$), waist circumference($p<.001$), and percentage of fat ($p<.001$) after 8-week intervention. However, therewere no significant difference in the systolic blood pressure ($p<.05$) after 8 weeks of intervention. Interestingly, these data showsignificant difference between week 1 vs week 4 ($p < .001$) in this study. This study concludes that meal plan and Zumba exercise provide significant effects on body weight, BMI, hip and waist circumference, percentage of fat and systolic blood pressure (week 1 vs week 4) thus may improve anthropometric and physiological indices among overweight women.

KESAN PELAN PEMAKANAN TERHADAP INDEKS ANTROPOMETRI DAN FISIOLOGIKAL DALAM KALANGAN WANITA YANG BERLEBIHAN BERAT BADAN YANG MENGAMALKAN ZUMBA

ABSTRAK

Tujuan kajian ini adalah untuk mengkaji kesan pelan pemakanan terhadap indeks antropometrik dan fisiologi seperti berat badan, Indeks Jisim Badan (BMI), lilitan pinggang dan pinggul, peratusan lemak dan tekanan darah dalam kalangan wanita yang mempunyai lebihan berat badan yang mengamalkan Zumba. Peserta terdiri daripada 20 orang wanita yang mempunyai lebihan berat badan yang berumur diantara 18 hingga 55 tahun, tidak terlibat dalam program penurunan berat badan, tidak menggunakan ubat, tidak mempunyai penyakit kronik dan tidak mengambil makanan tambahan atau penggantian makanan. Berat badan, BMI, lilitan pinggang, lilitan pinggul peratusan lemak dan tekanan darah diastolik dan sistolik diukur pada akhir minggu 1, minggu ke-4 dan minggu ke-8. Latihan Zumba bersama dengan intervensi pelanpemakanan diberikan kepada semua peserta dan data dikumpulkan dengan menggunakan catatan pemakanan 24 jam dan 3 hari catatan dieti. Kesan latihan Zumba dengan pelanpemakanan yang dianalisis dengan menggunakan ujian MANOVA sehala. Hasil kajian menunjukkan bahawa senaman Zumba yang digabungkan dengan pelan pemakanan menunjukkan perbezaan yang signifikan dalam berat badan ($p <.001$), BMI ($p <.001$), lilitan pinggul ($p <.001$), lilitan pinggang ($p <.001$), dan peratusan lemak ($p <.001$) setelah intervensi selama 8 minggu. Walau bagaimanapun, tidak terdapat perbezaan yang signifikan dalam tekanan darah sistolik ($p <.05$) setelah intervensi selama 8 minggu. Menariknya, data ini menunjukkan terdapat perbezaan yang signifikan antara minggu 1 danminggu ke-4 ($p <.001$) dalam kajian ini. Kesimpulan daripada kajian inimenunjukkan bahawa pelan pemakanan dan latihan Zumba memberikan kesan yang signifikan terhadap berat badan, BMI, lilitan pinggul dan pinggang, peratusan lemak dan tekanan darah sistolik (minggu 1 vs minggu ke-4) sekaligus dapat meningkatkan indeks antropometri dan fisiologi di kalangan wanita yang berlebihan berat badan.

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LIST OF ABBREVIATIONS

APA	American Psychological Association
BMI	Body Mass Index
Bpm	Beat per minutes
CDC	Centers for Disease Control and Prevention
FFM	Fat Free Mass
NHMS	National Health and Morbidity Survey
NIH	National Institute of Health
SPSS	Statistical Package for Social Sciences
UPSI	Universiti Pendidikan Sultan Idris
WC	Waist Circumference
WHO	World Health Organization

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CHAPTER 1

INTRODUCTION

1.1   Study Background

Obesity is one major health problem in Malaysia. According to the Chan, Lim, Lim, Teh, Kee, Cheong & Ahmad (2017) stated that the last decades have seen a growing trend toward obesity among children is associated with unhealthy dietary behavior and physically inactive. This may continue until adulthood. The NHMS reported the obesity prevalence was continuing to increase from 15.1% (NHMS, 2011) to 17.7% (Chan et. al, 2017). This data isalso supported by the World Health Organization (WHO) stated that there are 40% of individuals over the age of 18 years old in those categories in the overweight range. Moreover, previous studies have reported that the rate of overweight and obese was higher in women than in men (Mehrabani & Khazraei, 2018). It also has been reported by Rossmeissl, Lenk, Hanssen, Donath, Schmid Trucksäss, Schäfer (2016) which stated that the rate of overweight and obesity was higher in women compared to men in Turkey. There is a surprising paucity of cross-sectional studies describing how obesity is a global health

problem. A study by Pengpid & Peltzer (2019) stated that the obesity prevelence, which is BMI ≥ 30 kg/m² went up in women by 14.9%. Besides, Pengpid et al. (2019) also was reported that the prevalence of obesity among women adults in India also keep increasing the trends from 7% to 24% from 2011 to 2014. Suprisingly, these trends is keep increasing to 34.3% in 2013 to 2014.

In addition, the prevalence of obesity is increasing from time to time and has become a serious health issue. The latest data reported issues was reported in February 2020 stated that obesity had reached pandemic proportions globally with at least 2.8 million people was dying by each year as the results of being overweight and obese (WHO, 2020). Unexpectedly in Malaysia, the data shows the highest obesity prevalence among adults in South-East Asia at 15.6%, followed by Brunei which is 14.1%, followed by Thailand with 10% and last but not least Indonesia by 6.9% (Bernama, 2020). Surprisingly, the numbers of obese population donot only increase in adults, but it was three folds increase in children since 2011. The main factor of increasing in obese children it is due to lack of physical activities and food consumption may lead excess energy as fat store in the body (Bernama, 2020).

Obesity may lead to many risk factors. Surprisingly, a research study by Pengpid et al (2019), stated that the risk factors of overweight and obese were included the higher economic status, middle-aged categories, dietary risk, urban residence and dietary risk behaviors. Dietary behaviors risk may include a high intake of food that is high in sugar and fat, lack of intake of fruit and vegetables, and lack of exercise. Therefore, more strategies and interventions are needed to be conducted particularly on reducing obesity.

Debate continues about the best strategies for the management of dietary and physical activities for weight loss. There is a current of study describing the weight loss between 5% to 10% from the initial weight give beneficial effect and this approach brings an obese individual to get normal body weight with lifestyle modification approach (Foster Schubert, Alfano, Duggan, Xiao, Campbell, Kong & McTiernan, 2012). Health benefits participating in Zumba exercise may improve individual's wellbeing (Vendramin, Bergamin, Gobbo, Cugusi, Duregon, Bullo & Ermolao, 2016). Their findings demonstrated that Zumba exercise shows positive effects on anthropometric, muscular strength and quality of life. Besides that, Zumba exercise may also help for improving the mood and also body image. Positive image is one part of healthy mental attitude and also important for individual's wellness and happiness. Previous study reported by Hasanpour & Naderi (2007) which conducted research among depressed girls showed the significant effect of 8 weeks of exercise on their academic achievement and depression. Aerobic exercises showed an impact in improving academic performance and reducing depression. Zumba exercise does not only help in reducing weight but it also helps to fight the stress as well as improve mood (İmamoğlu & Özdenk, 2019). These findings provide additional evidence that suggests the Zumba exercise is not only effective on weight loss but gives more benefits in psychological aspects. This suggestion has also been supported by other research findings about Zumba exercise which stated that Zumba may also improve the body image (Baştuğ, Özcan, Gültekin & Günay, 2016). Enjoyment of the involvement or participation in exercise programmes may promote a healthy lifestyle. The single most striking observation that emerged from the previous finding was that Zumba exercise did not only improve mood, body image, body composition but

Zumba exercise helpedin improving body dynamic balance and functional fitness parameters.

To date, the study was reported by Arol (2020) stated that positive finding was found during the 8 weeks of Zumba exercise, as the finding has shown the significant result in total body weight loss, BMI parameter, percentage of body fat, functional movement screening and the lower and upper dynamic balance parameters among high school students with high body mass index of 15 to 17 years old of age.

The research by Miller, Koceja, & Hamilton (1997) compares that the weight loss through exercise only gives only 2-3kg reduction whereas through diet and exercise shows a much more reduction in weight which is 10-12kg or 9kg respectively). Combining diet with exercise resulted in 20% greater sustained weight loss after a year intervention than diet alone (Curioni & Lourenco, 2005). Therefore, combining the exercise and dietary modification can increase the reduction in weight as well as the abdominal adipose tissue (Giannopoulou et al., 2005). Generally, it was shown that diet and exercise programs produced a three-to-five-fold greater change in anthropometric measurement as comparedto applying the exercise programs alone.

Proper exercise and eating patterns changes were important and should be based on individual needs and belief, as they required high compliance to follow the order and dietary modifications were important on weight loss and fat reduction (Vassilopoulou, Piperari & Christoforou, 2017). A recent study has reported the beneficial effect on anthropometric in a short-term period at workplace aerobic program. The data shows the significant difference in BMI, fat index, fat mass and

lower limbs comparedto the control group (Iturriaga, Barcelo, Diez-Vega, Cordero, Pulgar, Fernández-Luna & Pérez-Ruiz (2020).

One of the dietary approach to combat the obesity is dietary meal plan(Fock, & Khoo,2013). This meal plan needs to be balance in macronutrients, vitamin and mineral. According to Malaysian Dietary Guideline (2020) stated that 50% - 60% of carbohydrate, 15% of protein and 25% - 30% of fat. Regular physical exercise enhances the efficiency of diet through increase in the satiating efficiency of a fixed meal, and is useful for maintaining diet-induced weight loss. Thid is support by a study conducted by Volek, Gomez, Love, Weyers, Hesslink, Wise, & Kraemer (2002) stated that including dietary intervension within 8 weeks' weight loss program shows the significant changes in percentages of fat, body weight and lipid profile among overweight women. Another research finding was conducted by Tovar, Johansson, & Björck (2016) stated that multifunctional dietary meal intervention shown the significant changes in weight loss and reduction in blood pressure among healthy participants within 8 weeks of intervention. In addition, acurrent study conducted by Muhammad, Safika, Wahyuni, Ermamilia & Huriyati (2019) stated that healthy nutrition programs and Zumba exercise are useful to improve body fat. Their research study shows the benefits for both groups which are subjects in normal weight and excess weight. One of the studies was conducted by Clarke, Freeland-Graves, Klohe-Lehman, Milani, Nuss & Laffrey (2007) stated that 8-week physical activity and dietary program shows the significant effect on waist circumference, percentages of body fat and waist circumference among low income mother and BMI is $\geq 25 Kg/m^2$. As summary, dietary and physical activity are important and crucial tools in promoting weight loss, prevention of chronic diseases and improved the self-efficacy

among participants. Therefore, the aim of this study was to investigate the effect of dietary meal plan on body weight, Body Mass Index (BMI), hip circumference and waist circumference, percentage of fat and blood pressure at the end of week 1, week 4 and week 8 among overweight women practicing Zumba.

1.2   Problem Statement

The Latin-inspired dance workout is one of the most popular group exercises in the world. Little data exist related to its effect on weight loss management by applying the meal planning as dietary intervention. Research was conducted by Ljubojević et al.(2014) stated that there is no proven data on the benefit of Zumba exercise and dietary intervention in women. This statement is supported with the research by Vassilopoulou, Piperari, &Christoforou (2017) that there is limited data on lifestyle modification with appropriate dietary intervention. Additionally, meal planning as a tool to maintain weight among successful weight losers but no data exists on the potential relationship with weight loss in the general population (Ducrot, Méjean, Aroumougame, Ibanez, Allès, Kesse-Guyot& Péneau, 2017). An interview was done when the experienced Zumba dancer stated that most of the Zumba dancers only did the exercise but did not control dietary intake. Therefore, they proposed in this study to observe the effect of dietary meal plan among overweight women who are practicing Zumba.
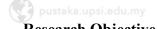
1.3　Significant of Study

This study helps in providing the deeper insights and understanding of meal plan to combat the obesity.The aims of this study to investigate theeffects of dietary meal plan on body weight, Body Mass Index (BMI), hip circumference, waist circumference, percentage of fat and blood pressure at the end of week 1, week 4 and week 8 among overweight women practicing Zumba. This is allowing the researchers to understand another approach for weight management as well as improved health status among overweight populations. Thus, the result of the study is important to change the thought among Zumbadancers that dietary intervention or control on diet is also important in order to prevent the chronic diseases and to combat the obesity in population.

1.4　Research Objective

1.4.1　General Objectives

To investigate the effect of dietary meal plan on anthropometric and physiological indices among overweight women practicing Zumba.

1.4.2　Specific Objectives

i. To investigate the effect of dietary meal plan on body weight, Body Mass Index (BMI), hip circumference, waist circumference and percentage of fat at

the end of week 1, week 4 and week 8 among overweight womens practicing Zumba.

ii. To investigate the effect of dietary meal plan on blood pressure at the end of week 1, week 4 and week 8 among overweight womens practicing Zumba.

1.5   Research Hypothesis

This study was to investigate the effect of dietary meal plan among overweight women who are practicing Zumba. The research hypothesis is as the following:

H_0 1   There was no significant effect of dietary meal plan on body weight, BMI, hip circumference, waist circumference and percentage of fat among overweight women practicing Zumba at the end of week 1, week 4 and week 8.

H_0 2   There was no significant effect of dietary meal plan blood pressure among overweight women practicing Zumba at the end of week 1, week 4 and week 8.

1.6   Limitation of study

There is a limitation of the study in research. The limitations are below:

i.   Participants did not give full commitment to the schedule.

ii.   Participants tend to skip the session and meal plan.

iii.   Participants also had personal problems or any other problem that made them unable to give full attention to the training.

iv.   Participants also needed to pay the fees of the Zumba trainer and session.

v.   Participants that had a fever or any kind of health problem that made them failed to complete the 8 weeks training.

1.7   Delimitation of study

There were several delimitations of study while preparing training and to get the finding of this study. The data would be affected and the accuracy of the result was less caused by the delimitation of study. Therefore, that could influence the finding result. Those were the delimitation of the study.

1.7.1   Participants

The participants were women who were practicing Zumba with BMI range between 25.0 - 29.9 Kg/m² (WHO, 2021). They are healthy, not on medication, must avoid intensive activity during intervention period and do not have other chronic diseases.

1.7.2   Zumba Design

They were trained five times per week (within 8 weeks) at 5.00pm (evening session). Zumba training (60 minutes) consists of basic exercises which are warm-up, workout,

cooling down and stretching. The songs were selected by a Zumba instructor and the music tempo ranged between 100 bpm – 140 bpm.

1.8   Operational Definition

1.8.1   Overweight

According to the World Health Organization (WHO, 2021) stated that being overweight is defined as abnormal or excessive fat accumulation that presents a risk to health. In addition, a Body Mass Index (BMI) which is over 25 is considered as overweight.

1.8.2   Anthropometric

Anthropometric is defined as the measurement of the human body. Anthropometric measurements assess the size, shape, and proportions of the human body. Commonly, anthropometric measurements include length or height, weightand Mid Upper Arm circumference (MUAC). When two or more anthropometric measurements are combined with each other, it is called an anthropometric index. This combination of information can be used to identify some nutritional conditions. Common anthropometric indices include weight-for height, weight-for-age, height-for-age, BMI (combination of weight and height), and BMI-for-age (The Food and Nutrition Assistant III Project, FANTA, 2012-2018)

1.8.3 Physiological indices

Physiological parameters, such as heart rate, blood pressure, body temperature, serum levels of various stress hormones (e.g. cortisol) and respiratory. (Veltman & Gaillard, 1996).

1.8.4 Zumba

Research conducted by Suri & Saini (2017) stated that the definition of Zumba was designed by Alberto "Beto" Perez during the 1990s and Zumba exercise involves Latin dance, aerobic exercise, Hispanic music, Latino music and a mixture of pop music.

1.8.5 Meal plan

According to the Malaysian Dietary Guideline (2020) stated that the number of servings calculated for dietary guidelines is based on 60% of carbohydrate, of which 50% is complex carbohydrate and 10% of refined sugar, 15% of protein and 25% of fat. In addition, the number of servings for macronutrient intake is calculated based on 1500kcal per day.