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Title: The importance of Dieraty, Physical Activity and Behavioural changes of individuals who maintained weight loss after attending the Romano Foundation Consultancy Clinic

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THE IMPORTANCE OF DIETARY, PHYSICAL ACTIVITY AND BEHAVIOURAL CHANGES OF INDIVIDUALS WHO MAINTAINED WEIGHT LOSS AFTER ATTENDING THE ROMANO FOUNDATION CONSULTANCY CLINIC

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Abstract

Background- There is an increase in the level of Obesity in individuals in Trinidad and Tobago. There are also many individuals who have taken the step to improve their life by attending weight loss clinics that are available throughout the country, one being The Romano Foundation Nutritional Consultancy Clinic. Many of the behaviours associated with weight loss and weight loss maintenance, according to studies, are dietary changes, increase in physical activity and lifestyle modifications.

Objective – To determine whether dietary, physical activity and lifestyle changes are important to clients of the Romano Foundation who have lost and maintained weight loss.

Methodology- a total of 141 (31 males, 110 females) clients were selected using convenience sampling. The data collection was carried out on both locations of the Romano Foundation. Data was analyzed using SPSS and the statistical tests performed were Chi-squared Test, Binary Logistic Regression and Multivariate Regression Analysis.

Results- Majority of the respondents said dietary changes, increase in physical activity and behavioural modifications changed their lives in a positive way, thus showing the importance of dietary changes in weight loss and weight loss maintenance. Ethnicity was the only predictor of weight loss and age was significant in determining who meets target weight. Also, there is no association between individuals who have lost and maintained weight and individuals who have lost but did not maintain weight loss

Conclusion – Dietary changes, physical activity and behavioural modification are all important to the members of the Romano Foundation Nutritional Consultancy Clinic. There is no association between individuals who have lost and maintained weight and individuals who have

lost but did not maintain weight loss while on The Romano Foundation weight loss program. Additionally, age is the only predictor of meeting the target weight by the clients and ethnicity was the only predictor of weight loss. Tests proved that the Romano Foundation does not discriminate against gender, age, ethnicity, education level or income level.

Chapter 1

INTRODUCTION

Background

Obesity is said to be the accumulation of excess adipose tissue in the body (Boyle et al. 2010). During the past 15 years, obesity has emerged as a significant health problem because of its increasing and high prevalence, as well as the morbidity and mortality attributed to it. The increase of Obesity has been noted in both adults and children in the Caribbean and has now become a significant public health issue (Henry, 2001 and Boyle et al. 2010). It has been shown that obesity is mainly a result of an imbalance between the amount of food consumed and the level of an individual's physical activity, although lifestyle, environment and genes are said to be related to it as well (Mahan et al. 2010).

Consequently, some studies have shown that environmental factors, lifestyle preferences, and cultural environment play pivotal roles in the rising prevalence of obesity worldwide but in general, overweight and obesity are assumed to be the results of an increase in caloric and fat intake. On the other hand, there are supporting evidence that excessive sugar intake by soft drink, increased portion size, and steady decline in physical activity have been playing major roles in the rising rates of obesity all around the world. Consequently, both over-consumption of calories and reduced physical activity are involved in both childhood and adult obesity (Dehghan et al. 2005 and Mahan et al. 2010)

Over the last two decades, increased investment has gone into research focused on the role of lifestyle practices in the development of Obesity and the effect that modification of these practices may have on its prevention. To date, the most significant modifiable risk factor that has

been identified in relation to the development of obesity is poor diet and inadequate physical activity (Nelms et al. 2011). Additionally, it was shown that obese individuals are at increased risk for co morbidities of diseases such as type 2 diabetes, hypertension, stroke, certain cancers, infertility and many other conditions (Gualillo, 2010). What and how much one eats plays an integral role in body weight. Researchers have found that a diet high in saturated fat not only increases one's risk of obesity but by extension it also increases one's risk for other co morbidities. Published studies have concluded that persons who consume diets high in saturated fats such as those consumed by Western cultures may have significant risk (>1) for co morbidities such as type two diabetes when compared to diets low in saturated fats such as the Mediterranean diet (Krishan et al. 2009). Similarly diets high in refined sugars such as sucrose, high fructose corn syrup and glucose which are found in high quantities in sweetened beverages such as sodas and juice drinks; may also cause an increased risk for obesity. Such high sugar drinks have been found to increase the chances of developing many other diseases associated with obesity (Schulze et al. 2004)

As previously mentioned, activity level, according to researchers is also a key lifestyle factor associated with obesity. Low levels of physical activity or the sedentary lifestyle has been found to be strongly associated with risk of obesity. Research has concluded that persons who are moderately active are at reduced risk for obesity when compared to sedentary persons (Jeon et al. 2007). While this has been scientifically proven, the same conclusion can be drawn from simple observation. As the world becomes more and more modern, a greater amount of time is devoted to sedentary activities such as watching television and surfing the web and less time to more physically intense activities such as gardening. Likewise as the world becomes more modern the prevalence of obesity continues to grow rapidly.

According to Mahan et al, 2010, there are many underlying factors which have been linked to the increase in obesity prevalence, such as increasing portion sizes; eating out more often; increasing television or computer viewing or electronic gaming time; changing labour markets; and fear of crime, which prevents outdoor exercise. These activities which have been adapted by modern day society have damaged communities worldwide by promoting risks for many diseases which can be altered by modifying lifestyles, diets and physical activities. These alterations are now being adapted by few individuals who may be ill and need to make decisions to improve their lives, who may be uncomfortable with their image or even those who may simply want to live a healthy lifestyle. Many clinics offer assistance to improve the lives of obese and overweight individuals throughout Trinidad and Tobago, some of these clinics are The Romano Foundation, Sure Way, Nirvana, Weight loss 360, Marlene's Weight loss Clinic and many others. The clinic observed in this study was The Romano Foundation.

The Romano Foundation is a nutritional consulting centre in Trinidad and Tobago which provides personalized, professional eating plans according to each individual's health condition. They work alongside the World Health Organization (W.H.O.), the Pan-American Health Organization (P.A.H.O.) and the Ministry of Health of Trinidad and Tobago to improve lifestyles through improved nutrition and physical activity. The diets are based on the client's blood type, low glycemic index foods, and control of daily intake of carbohydrates, sugars, fats and proteins. The dieticians in this centre believe manipulation of foods based on one's health condition can improve lifestyles completely, with their assistance, because they offer a program which has no calorie counting, no crash diets, no injections and no suppressants, fat burners or colon cleansers. Dr. Tull, 2012, believes that eating properly is the key to prevent serious health problems that have become a plague to modern day society.

This growth in obesity has been significant in recent years among both young and old persons including children, adolescents and young adults. Although it has been one of the world's most prevalent diseases for the past few decades, obesity has long been thought of as a hereditary disease as mainly family members of obese individuals have been diagnosed as being obese. However these views are slowly being changed, even here in the Caribbean, as a similar trend emerges among the young population. This presents a potential health crisis for Caribbean governments; however it may be a crisis that can be avoided if urgent preventative steps are taken (Henry, 2001).

Purpose of the Study

The purpose of the study is to investigate whether dietary changes, increase in physical activity and lifestyle modifications is important in losing and maintaining weight loss in clients of The Romano Foundation Nutritional Consulting Centre.

Rationale

The authorities have in recent times been reporting that there is a steady increase in the number of children, young persons and adults being diagnosed with obesity in the Caribbean and in Trinidad and Tobago. The Minister of Health of Trinidad and Tobago, Dr. Fuad Khan, have made many attempts to improve healthy lifestyles through workshops and advertisements. Research has shown that in Trinidad and Tobago, at least quarter (25%) of the population is overweight or obese. Obesity remains a major concern due to its impact on the development of risk factors leading to chronic non-communicable diseases (CNCDs) such as cardiovascular diseases, cancer, diabetes and strokes later on in life. The Minister also stated that Trinidad and Tobago has reported the highest overall percentage of deaths within the Caribbean region, at

60%, heart disease was proven to be the number 1 cause of death in Trinidad and Tobago accounting for 25% of all deaths, the diabetes prevalence rate among adults is approximately 12% - 13% and 50% of persons, 24 – 64 years, already has 3 or more risk factors for CNCDs. High prevalence of CNCD rates among adult and children is related to unhealthy diets (high fat, salt & sugar), insufficient physical activity and low consumption of fruits and vegetables (less than 3 servings per day). The issues of concern are unhealthy diets and lifestyles and low levels of physical activity. This warrants research into whether these and other possible factors needs to be modified in order to promote weight loss and weight loss maintenance in clients of The Romano Foundation as well as the population. Such an investigation will also provide a basis for intervention as the specific behaviors can be identified and addressed.

Problem Statement

Observed behaviours among the clients of the Romano Foundation Nutritional Consultancy Clinic show that dietary changes, increase in physical activity and lifestyle modifications may all be needed to attain weight loss and to maintain weight loss. The relationship between these factors must be determined to estimate whether it is important to weight loss maintenance.

Objectives

General Objective

To determine the relationship between diets, physical activity and lifestyle modifications in individuals who have maintained weight loss while attending the Romano Foundation. Also, to investigate the association between the individuals who have lost and maintained weight and who have lost but did not maintain weight loss.

Specific Objectives

- To determine the importance of dietary changes on weight loss and maintenance in clients of The Romano Foundation.
- To determine the importance of physical activity on weight loss and maintenance in clients of The Romano Foundation.
- To determine the importance of lifestyle modification on weight loss and maintenance in clients of The Romano Foundation.
- To determine the association between individuals who have lost and maintained weight and individuals who have lost but did not maintain weight loss while on The Romano Foundation weight loss program.

Hypotheses

- There is a significant relationship between dietary changes and weight loss and weight loss maintenance in clients of The Romano Foundation.
- There is a significant relationship between increase in physical activity and weight loss and weight loss maintenance in clients of The Romano Foundation.
- There is a significant relationship between lifestyle modifications and weight loss and weight loss maintenance in clients of The Romano Foundation.

Chapter 2

LITERATURE REVIEW

Obesity is considered to be an excess proportion of total body fat. An individual is classed as being obese when his or her weight is 20% or higher above normal weight. The most common measure of obesity is the body mass index (B.M.I.) and this is a measure of an individual's weight (in kilograms) against height (in meters squared). When a person's B.M.I. is between 25 and 29.9, they are classified as being overweight whilst a B.M.I. of above 30 will indicate that the individual may be obese. Morbid obesity may be classed as any individual who may either have a B.M.I. of over 40, is 50%-100% over normal weight, is 100 pounds over normal weight or is sufficiently overweight to severely interfere with health or normal function (Nazario, 2011). In the Caribbean, obesity has grown by almost 400% over a 30 year period. It is now one of the most important underlying causes of death in the region and should be prevented at any cost because treatment is difficult (Henry, 2006).

Weight Loss

Weight loss is necessary to curb the present epidemic of obesity in the Caribbean. Weight loss is said to be a decrease in body size which results from either voluntary or involuntary circumstances. Voluntary being diet, exercise and behavioural changes and involuntary being surgical procedures and illness (Mednet, 2012). Whereas other researchers claimed that weight loss is only classified under this term when individuals have intentionally lost at least 10% of their initial body weight and was able to maintain this weight loss for at least one year. The general perception of long-term weight loss maintenance is that no one succeeds at achieving this, whereas studies have shown that approximately 20% of overweight individuals

have been able to lose weight and maintain the weight loss (Wing et al. 2005).There are multiple factors which when combined can promote weight loss and in turn decrease levels of obesity, such factors are changes in amount, type and variety of dietary intake, changes in the individual's behavior and mindset and changes in levels of physical activity (Mahan et al. 2010).

Additionally, it is of the belief that successful weight management to improve overall health for adults requires a lifelong commitment to healthful lifestyle behaviors emphasizing sustainable and enjoyable eating practices and daily physical activity (American Dietetic Association, 2009). Given the high and increasing incidence of overweight and obese individuals along with the escalating health care cost associated with weight-related illnesses, health care providers must discover how to effectively treat this complex condition. Professionals in the field of nutrition needs to stay current and skilled in weight management to assist clients in preventing weight gain, optimizing individual weight loss interventions, and achieving long-term weight loss maintenance (Mahan et al. 2010). It is also the position of the American Dietetic Association that recommendations and current data for weight management needs to be assessed because there are now evidence supporting the value of portion control, eating frequency, meal replacements, very-low-energy diets, physical activity, behavior therapy, pharmacotherapy, and surgery in the weight management field. It is also believed that public policy changes to create environments that can assist all populations to achieve and sustain healthful lifestyle behaviors are beneficial in the eradication of obesity.

Diet Modification

A modified diet is any diet which is altered to include or exclude certain components such as calories, fat, vitamins and minerals (Nelms et al. 2011 and Mahan et al. 2010). Typically,

diets are modified for therapeutic reasons, including treatment of blood pressure, low body weight or vitamin and mineral deficiencies. Any diet can be modified; common therapeutic modifications include lowering fat intake, increasing or decreasing caloric intake depending on weight, and increasing certain nutrients (Etholen, 2010).

Weight loss and subsequent body weight maintenance are difficult for obese individuals despite the wide variety of dietary regimens and approaches. A substantial body of scientific evidence has indicated that by varying the macronutrient distribution and composition of dietary factors, weight losses of varying amounts, longer-term body weight maintenance periods, better appetite regulation and changes in features of metabolic syndrome can be achieved (Abete et al. 2010). Researchers defined dietary macronutrient composition as containing carbohydrates, fats and proteins as percentage in energy intake, fat quality in diet: variation in saturated, monounsaturated or polyunsaturated fatty acids, as in percentage in energy intake, sugar intake as percentage in energy intake and/or fibre intake as grams per day (Fogelholm, 2012).

Furthermore, studies show that if diet is modified and maintained, weight loss and maintenance can be achieved. This was proven in a study carried out on 101 individuals (31/50 subjects in the moderate-fat group, and 30/51 in the low fat group). In the moderate-fat group, there were mean decreases in body weight of 4.1 kg, body mass index of 1.6 kg/m(2), and waist circumference of 6.9 cm, compared to increases in the low-fat group of 2.9 kg, 1.4 kg/m(2) and 2.6 cm, respectively; $P < \text{or} = 0.001$ between the groups. The difference in weight change between the groups was 7.0 kg. (95% confidence interval, 5.3, 8.7). Only 20% (10/51) of those in the low-fat group were actively participating in the weight loss program after 18 months compared to 54% (27/50) in the moderate-fat group, ($P<0.002$). The moderate-fat diet group was continued for an additional year. The mean weight loss after 30 months compared to baseline

was found to be 3.5 kg (n = 19, P = 0.03). It was later concluded by the researchers that a moderate-fat, Mediterranean-style diet, controlled in energy, offers an alternative to a low-fat diet with superior long-term participation and adherence, with consequent improvements in weight loss (McManus et al. 2001). Thus, dietary changes do have a positive effect on weight loss and maintenance.

Lifestyle and Behavioural Modification

Changes in behaviour and lifestyle are very important when attempting to lose weight and maintain this weight loss permanently (Mahan et al. 2012). Findings in a study suggest that behaviour modification is effective in extinguishing eating disorders; they also indicated that a realistic attitude towards an individual's own fatness with a strong motivation and a good relationship with the dietician guarantees a greater weight loss (A. Traverso et al. 2000). Studies also suggest that the inclusion of a family component is more beneficial than a regimen which does not include the family component; this was proven especially in children. It also showed that significant weight loss and maintenance is more likely to be achieved once the family is included in the individual's weight loss program (M. Young et al. 2007)

Equally important is counseling, which is another component needed when attempting to achieve long term weight loss maintenance. A study carried out suggests that a weight loss program that includes counseling assists patients in developing their self-monitoring skill which in turn facilitates weight loss (S. Hitomi et al. 2009). They also indicated that behaviour modification is essential for both the prevention and treatment of obesity but it is extremely difficult to encourage people to modify their behaviour in order to achieve a healthier lifestyle because lifestyles depends largely on individual beliefs and values thus behavioural-scientific

approaches are now being used. Obesity is one of the risk factors for lifestyle-related diseases (Mahan et al. 2012) and further studies by S. Hitomi et al. 2009, suggested that lifestyle-related diseases are closely associated with psychosocial stress thus it is necessary to assess obese patients' psychosocial status as to provide them with psychological support which proved to be beneficial to weight loss.

As a result of individuals being adamant on not modifying their behaviour to living healthier lifestyles, a Health Belief Model was developed to explain why such behaviour is experienced. The health belief model is a tool that scientists use to try and predict health behaviors. It was originally developed in the 1950s, and updated in the 1980s, it is based on the theory that a person's willingness to change their health behaviors is primarily due to perceived susceptibility; which is when people will not change their health behaviours unless they believe that they are at risk, perceived severity; which is the probability that a person will change his/her health behaviors to avoid a consequence depending on how serious he or she considers the consequence to be, perceived benefits; it is difficult to convince people to change a behavior if there is not something in it for them and perceived barriers; which is the thought of the task of changing a particular health behaviour will be difficult (Green et al. 1999). The Health Belief Model is realistic, in that it recognizes the fact that sometimes wanting to change a health behaviour is not enough to actually make an individual do it, and it incorporates two more elements into its estimations about what it actually takes to get an individual to make the leap. The elements are cues to action and self efficacy. Cues to action are external events that prompt a desire to make a health change; they can be anything from a blood pressure van being present at a health fair, to seeing a condom tent in town, to having a relative die of HIV. A cue to action is something that helps move someone from wanting to make a health change to actually making

the change. Self efficacy is the person's belief in his/her ability to make a health related change. It supports the faith in one's ability to do something and it has an enormous impact on one's actual ability to do it, thinking that one will fail will almost make certain that one does (Becker et al. 1977). Thus from the model it can be said that lifestyle modification is necessary in establishing weight loss and maintenance in obese and overweight individuals.

Physical Activity

Physical inactivity has been shown to contribute to the increasing levels of obesity in communities throughout the Caribbean (Henry, 2006). Wing, 1999 supported that exercise creates improvements in obesity cases but argues that effects on weight loss maintenance are often modest. Wing, 1999 also suggested that different types of exercises carried out at varying duration times will promote long-term weight loss but better ways to assess these activities needs to be achieved. Many studies support that physical activity does indeed assist in decreasing obesity levels but has a greater impact on weight loss when diet is altered. According to V. Catenacci et al. 2007, little weight loss was achieved when physical activity was increased alone as compared to when both physical activities was increased and dietary intake was modified, the study also concluded when diet and physical activity is combined, the ability for weight loss to be maintained is increased.

Even though physical activity in itself has shown to be effective in lowering obesity cases, studies suggest that self-efficacy and diet are major contributors' as well. Research has shown that the best way to lose and maintain weight loss is to combine all three factors (increase in physical activity levels, diet modification and behavior modification) and for the change to be continued and made into a lifelong commitment (Paez et al. 2000). Additionally, Ross et al.

2000, confirms that in order to attain and maintain the health benefits of exercise, regular, moderate-intensity physical activity, such as brisk walking for at least 30-60 minutes on most days of the week needs to be carried out (Drewnowski et al. 2012). They also suggest that "substantial reductions in obesity and related co morbid conditions will result when daily exercise is performed at a moderate intensity for 45-60 minutes a day without decreasing caloric intake." Since studies have shown that increase in physical activity can be used to decrease the incidences of obesity, nutrition health officials' needs to act to promote increase in physical activity throughout communities.

In conclusion, based on previous studies, an increasing number of people worldwide are obese or overweight, and being overweight increases the risk of developing chronic diseases. Many who lose weight eventually regain most of the lost weight and although much research has focused on behaviors that lead to weight loss, less research is available on weight loss maintenance (Nelms et al. 2011). Data are scant on behavioral strategies related to maintaining weight loss whilst one widely accepted idea is that successful and sustainable weight loss requires paying attention to both sides of the energy-balance equation: energy intake through food and drink and energy expenditure through physical activity (Mahan et al. 2010). Current recommendations encourage people trying to control their weight to increase their energy expenditure by increasing the amount of physical activity performed (Bouchard et al. 2010). Although the level of physical activity recommended to lose weight or prevent weight gain varies, energy expenditure through physical activity is determined largely by the interaction between frequency, duration, and intensity (Nelms et al. 2011). Recommended amounts of physical activity for weight management are at least 30 minutes of moderate-intensity physical activity on most days of the week. Behavioral modification often involves behavioral strategies that reinforce changes in diet

and physical activity; it can include becoming educated about food preparation, label reading, and self-monitoring of diet and physical activity. Many diet regimens incorporate behavioral modification strategies to help people build confidence in their ability to modify their eating and physical activity behaviors because confidence in one's ability to take action and overcome barriers is believed to be an important personal factor in behavior change. Thus alterations in diet, physical activity and lifestyle will indeed assist in losing and maintaining weight loss in overweight and obese individuals.

Chapter 3

METHODOLOGY

The target population of the study was the patients of The Romano Foundation Nutritional Consultancy Clinic, Woodbrook and Chaguanas branch; this included both children (under the age of 18) and adults (over the age of 18). Thus all subjects selected in the sample were required to be currently registered as clients of the foundation. The required sample size was estimated using a statistical formula. The formula was based on the estimation of the percentage of clients who experienced desired weight loss with a margin of error of 0.8%. The clients were questioned on importance of physical activity; dietary and lifestyle modification. The required sample size calculated with a 5% level of significance was 126 students ($n = (1.96^2\ \hat{p}\hat{q}) / 0.0064$) which is ($n = 1.96^2\ (0.7)(0.3) / 0.0064$)

Sample Selection- the required sample size was selected using the non probability method of convenience sampling; therefore subjects were selected based on accessibility to the researcher and their willingness to participate. Participants were informed of the study by word of mouth. Persons reporting to the testing site were selected for participation until a total of 141 persons were met.

Study Design and Data Collection- the study design was divided into two major components which were a printed data collection questionnaire and data collected from the Dietician about each client. The questionnaire was divided into four (4) sections. Section one (1) focused on

demographics and included six (6) questions. Section two (2) focused on dietary changes about the client and included eleven (11) questions. Section three (3) was seven (7) questions which propelled towards the importance in physical activity and section four (4) aimed to understand the patient's lifestyle modifications which consisted of thirteen (13) questions. The data collected from the dietician was the patient's age, starting weight, target weight, present weight and the time taken to lose weight

Data Collection- data was collected over a four (4) week period until a sample size of 141 was met. Testing was conducted at both locations of The Romano Foundation, (Baden Powell Street, Woodbrook and Endeavor Main Road, Chaguanas). Participants were first required to complete the questionnaire provided. Upon completion, the dietician gave all other relevant information about the client in their presence.

Statistical Analysis- All data was analyzed using the statistical software SPSS 17.0 for Windows. Various statistical tests were used to generate frequencies, calculate means, to compare and find associations between variables and to predict risk. These test included the Chi-squared Test, Binary Logistic regression and Multivariate regression Analysis (determines linear relationship between variables). The SPSS software was also used to generate descriptive statistics which included bar graphs, statistical tables and pie charts. All tests were conducted at the 5% level of significance ($p \leq 0.05$).

Chapter 4

RESULTS

Demographics

Gender

The sample consisted of 142 clients with a majority of one hundred and ten (110) being females, accounting for 78.01% of all respondents. A total of thirty one (31) males participated in the study accounting for 21.99%.

Age

The majority, 34.75% (n=49) of the respondents were in the 41-50 age group, 29.79% (n=42) were in the age group of 31-40, 19.86% (n=28) were in the age group of 51-60, 7.09% (n=10) of the respondents were above the age of 60, 6.38% (n=9) were within the age group of 26-30, a minority of 1.42% (n=2) were within the age group of 18-25 and 0.7% (n=1) were below the age of 18

Ethnicity

With regards to ethnicity, a majority of 39.09% (n=55) of the participants were of mixed race while 30.50% (n=43) were of Caucasian descent. Additionally 15.60% (n=22), 12.06% (n=17) and 2.84% (n=4) were of African, East Indian and Chinese descent respectively.

Present Weight

Majority of the respondents 18.44% (n=26) were within the weight range of 121-140 pounds while 17.73% (n=25) were within the weight range of 161-180 pounds, 14.89% (n=21) were between 201-220 pounds and 15.60% (n=22) were within the weight ranges of both 141-160 and 181-200 pounds. Regarding present weight, 5.67% (n=8), 4.26% (n=6), 2.84% (n=4) and 2.13% (n=3) were within the weight ranges of 221-240, 241-260, 110-120 and 301-320 pounds respectively. Of all the respondents, 1.42% (n=2) were within the ranges of 261-280 and 281-300 pounds and no respondent was above 321 pounds.

Educational Level

The majority, 59.57% (n=84) of the respondents were tertiary educated while 0.71% (n=1) were primary educated. More than one third 34.75% (n=49) of the respondents had secondary school education whereas 4.97% (n=7) had vocational schooling and no respondent had an education level below primary school.

Income

Regarding income, almost half, 51.06% (n=72) of the respondents received wages of $6001-$8000 while 19.86% (n=28) had incomes between the range of $4001-$6000, 13.48% and 5.67% received wages between the ranges of $1001-$4000 and $500-$2000 respectively. Almost 10%, (9.93%, n=14) collected wages over $8000 and no respondent had an income below $500.

Table 1 Frequency and Percentages for Demographic Variables within Sample Group.

Variable	**Categories**	**Frequency** **n=196**	**Percentage (%)**
Gender	Male	31	21.99
	Female	110	78.01
Age	18-25	2	1.42
	26-30	9	6.38
	31-40	42	29.79
	41-50	49	34.75
	51-60	28	19.86
	61 & over	10	7.09
Ethnicity	East Indian	17	12.06
	African	22	15.60
	Chinese	4	2.84
	Caucasian	43	30.50
	Mixed	55	39.01
Present Weight	110-120	4	2.84
	121-140	26	18.44
	141-160	22	15.60
	161-180	25	17.73
	181-200	22	15.60
	201-220	21	14.89

Table 1 Frequency and Percentages for Demographic Variables within Sample Group (cont'd).

Variable	**Categories**	**Frequency** **n=196**	**Percentage (%)**
	221-240	8	5.67
	241-260	6	4.26
	261-280	2	1.42
	281-300	2	1.42
	301-320	3	2.13
	321 & over	0	0
Edu Level	Primary	1	0.71
	Secondary	49	34.75
	Tertiary	84	59.57
	Vocational	7	4.97
	None	0	0
Income	Below $500	0	0
	$500-$2000	8	5.67
	$2001-$4000	19	13.48
	$4001-$6000	28	19.86
	$6001-$8000	72	51.06
	Over $8000	14	9.93

Dietary, Physical Activity and Lifestyle Questions from Questionnaire

(Only questions directly answering the objectives were explained.)

Based on Question 6, it can be seen that more than three quarter of the respondents 75.9% (n=107) said diet modification changed their lives in a positive way, thus showing the importance of dietary changes in weight loss and weight loss maintenance. Almost one quarter of the respondents, 24.1% (n=34) answered that the dietary changes made did not change their lives and thus, was not important.

Based on question 16, it was shown that majority of the respondents, 72.3% (n=102) believed that physical activity was important in their journey to weight loss and eventually maintenance whilst more than a quarter of the subjects, 27.7% (n=39) responded that they believed physical activity was not important in their journey to weight loss and weight loss maintenance.

From question 19, it can be seen that almost two thirds of the respondents, 63.8% (n=90) believed that a change in lifestyle is necessary and important in their journey to weight loss and maintenance whereas almost a quarter, 21.3% (n=30) believed it was not necessary. In regard to lifestyle changes, 21 of the respondents (14.9%) said they believe lifestyle modification is necessary in their weight loss journey sometimes.

Table 2 Responses to questionnaire items by sample group

Number	Item	Always/Yes	Sometimes	No/Never
1	Were the foods that you usually consume difficult for you to give up	32(22.7)	38(27)	71(50.4)
2	Do you dislike the dietary changes that you have to make in order to lose weight or maintain weight loss	32(22.7)	15(10.6)	94(66.7)
3	Was the change in diet difficult for you to adapt to	35(24.8)	69(48.9)	37(26.2)
4	Have you ever had success with Low Carbohydrate diets	36(25.5)	N/A	105(74.5)
5	Do you use specific weight loss recipes as part of a healthy diet plan	88(6204)	18(12.8)	35(24.8)
6	Did the diet modification improve your life	107(75.9)	N/A	34(24.1)
7	Did the weekly digital acupuncture help to decrease your appetite	28(19.9)	N/A	113(80.1)
8	Do you snack daily	116(82.3)	19(13.5)	6(4.3)
9	Do you know and understand how to read food labels	69(48.9)	N/A	72(51.1)
10	Do you eat food in correct proportions	79(56)	N/A	62(44)
11	Do you eat breakfast, lunch and dinner on a timely and regular basis	25(17.7)	36(25.5)	80(56.7)

Table 2 Responses to questionnaire items by sample group (cont'd)

Question	Item	Always/Yes	Sometimes	No/Never
12	Do you prefer endurance exercise over strength exercise	102(73.3)	14(9.9)	25(17.7)
13	Aside from diet and physical activity, have you done any other activity to assist in using weight	27(19.1)	N/A	114(80.9)
14	Was the increase in exercise difficult	34(24.1)	91(64.5)	16(11.3)
15	Is your physical activity exercise carried out over 40 minutes	117(83)	15(10.6)	9(6.4)
16	Is exercise important in your weight loss journey	102(72.3)	N/A	39(27.7)
17	Were you uncomfortable with your body before dieting	108(76.6)	7(5)	26(18.4)
18	Did this lead to your weight change	91(64.5)	N/A	17(15.7)
19	Did you have to change your mind set in order to lose and maintain weight loss	90(63.8)	21(14.9)	30(21.3)
20	Was it easy to manipulate your mind to facilitate your lifestyle modification	32(22.7)	78(55.3)	21(22)
21	Did your family support and adapt to your lifestyle modification easily	33(23.4)	17(12.1)	91(64.5)
22	Have you ever been successful with general weight loss plans and kept the weight off	40(28.4)	N/A	101(71.6)

Table 2 Responses to questionnaire items by sample group (cont'd)

Question	Item	Always/Yes	Sometimes	No/Never
23	Is your change in lifestyle important in your journey to weight loss	92(65.2)	N/A	49(34.8)
24	Do you know what a balanced meal consists of	82(58.2)	N/A	59(41.8)
25	Do you believe you are well-educated in the nutrition field to carry out daily eating routines without a diet sheet to follow	44(31.2)	N/A	97(68.8)
26	Were you diagnosed with any type of chronic disease related to having excess weight	38(27)	N/A	103(73)
27	Did you believe initially that losing and maintaining weight was possible for you	53(37.6)	N/A	88(62.4)
28	Have any major life events occurred which made you gain weight	32(22.7)	N/A	109(77.3)

Chi- Squared Test

Based on the results obtained, there is no association between any of the variables and weight loss because none of the P value for either of the variables were < 0.05. Thus, the weight loss program provided by the Romano Foundation Nutritional Consulting Clinic does not discriminate against age, ethnicity, education levels, income level or gender.

Table 3 Association between whether target was met and selected variables

Variables	Chi-Squared	d.f	P Value
Age	6.77	5	0.238
Ethnicity	2.60	4	0.026
Education	1.29	3	0.732
Income	2.44	4	0.655
Gender	3.36	1	0.067

Binary Logistic Regression

Based on the results obtained, ethnicity is the only useful predictor of whether target weight of the patient is met or not, because the P value was found to be < 0.05 (0.028). Gender, age, education level and income do not predict whether a patient is able to lose weight or maintain weight loss because none of the P values were significant, all were found to be > 0.05.

Table 4 Association between selected variables and whether or not target weight was met.

Variable	OR	CI for OR	P Value
Gender	0.274	(0.075, 1.000)	0.50
Age	.756	(0.516, 1.107)	0.151
Ethnicity	1.466	(1.041, 2.064)	0.028
Education	1.427	(0.690, 2.949)	0.337
Income	0.901	0.602,1 .351)	0.615

Multivariate Regression Analysis

The logistics show that no variable except age determines the time taken to lose weight; this is so because the P value was found to be < 0.05 (0.024), all the other variables' P values were > 0.05. In table 6 it can be seen that older people lost weight faster than younger people**.**

Table 5 Test of Differences in Weight Loss by Selected Variables

	Weight Loss			Time to lose		
Variable	Mean	Standard Deviation	P value	Mean	Standard Deviation	P Value
Gender	23.62	20.03	0.079	12.23	5.916	0.667
Age	23.57	20.10	0.793	12.24	5.936	0.024
Ethnicity	23.62	20.03	0.956	12.23	5.916	0.868
Education	23.62	20.03	0.331	12.23	5.916	0.389
Income	23.62	20.03	0.808	12.23	5.916	0.563

Table 6 Case summary of age ranges and mean of each range

Age Range	N	Mean
18-25	2	19.50
26-30	9	7.11
31-40	42	12.62
41-50	49	13.43
51-60	28	11.20
61 & over	10	12.24

Chapter 5

DISCUSSION

The growing trend of Obesity among citizens of Trinidad and Tobago provides a pertinent rationale for this research. Studies have consistently linked Obesity to a variety of modifiable lifestyle risk factors. Commonly included among these are high fat/ high proportion of food consumption, physical inactivity and lack of motivation and will power (Brown 2011). These risk factors are repeatedly target because they are associated with many other co morbid diseases such as Diabetes, Hypertension, Heart Diseases and many other diseases. The occurrence of any one of these factors increases one's risk for Obesity, thus occurrence of more than one further increases risk. Based on observation, it was seen that among the clientele of the Romano Foundation Nutritional Consultancy Clinic, factors such as diet modification, physical activity and lifestyle changes were adopted by the clients in an attempt to lose weight and to maintain weight loss, prompting the need to investigate the importance of these factors to the clients of the Romano Foundation Nutritional Consultancy Clinic.

The results from this study suggests that most of the patients of the Romano Foundation, 75.9% (n=107) showed that dietary changes was indeed important in weight loss and weight loss maintenance, this is supported by many studies. According to Etholen, 2010, any diet that is modified to improve healthy living will assist in the reduction of weight loss, even though weight loss may be challenging in different individuals. Studies carried out by scientists also show that subjects which had undergone dietary changes lost a substantial amount of weight as compared to those subjects who did not change their usual diet (McManus et al. 2001). Weight loss and weight loss maintenance can be achieved through constant monitoring of the types and amounts of foods being consumed, thus if foods are manipulated to benefit a particular individual based

on their age, weight, gender, ethnicity and health, weight loss can be achieved. And once this factor is kept under scrutiny, weight loss maintenance will eventually be achieved. Though almost one quarter of the respondents, 24.1% (n=34) answered that the dietary changes did not change their lives, this factor is still of importance. These respondents may have replied in this way because they might have recently joined the program and may not have had a high level of weight loss.

This study shows that a high percentage of the respondents, 72.3% (n=102) believed that physical activity was important in their journey to weight loss and eventually maintenance. Studies show that physical activity improves the lives of obese and overweight individuals and further improvement can be made based on the type of physical activity and the length of time the activity is carried out (Wing 1999). Though many studies support increase in physical activity to promote weight loss, most promote dietary changes alongside the physical activity (Catenacci et al 2007), this study also showed that the combination of physical activity and diet modification assist in weight loss maintenance. Studies also show that changes in mind set along with physical activity and dietary changes helps to reduce weight and maintain weight loss, thus combination of all three factors along with consistency are major contributors to weight loss and weight loss maintenance (Paez et al. 2000 and Ross et al. 2000). More than a quarter of the subjects, 27.7% (n=39) responded that they believed physical activity was not important in their journey to weight loss and weight loss maintenance which may be due to their inability to exercise the length of time they should (minimum of 45 minutes) (Mahan et al. 2012).

According to the statistics, 63.8% (n=90) believed that a change in lifestyle is necessary and important in their journey to weight loss and maintenance, this is supported by many studies such as one carried out by Young et al. 2007, which proved that weight loss programs which

included the family component, counseling and development of self monitoring skills is more successful in getting clients to lose and maintain weight loss (Hitomi et al. 2009). Additionally, behaviour modification is essential in the weight loss and weight loss maintenance journey, Mahan 2012 explained that though it is difficult to encourage people to modify their behaviour in order to achieve a healthier lifestyle, it is necessary to achieve improvement in obese and overweight individuals. The health belief model, as explained earlier is a tool used by nutritionists and dieticians to explain why it is difficult to change the behaviours of many individuals; it is based on the theory that a person's willingness to change depends on perceived susceptibility, perceived severity, perceived benefits and perceived barriers (Green et al. 1999). Thus, based on the above mentioned, lifestyle and behavioural changes are necessary for weight loss and weight loss maintenance, though almost one quarter of the respondents, 21.3% (n=30) believed it was not necessary. This may have been this way because of arrogance or because the dietician may not have explained fully the necessity to change behaviour in order to enhance weight loss and maintenance. In regard to lifestyle changes, 21 of the respondents (14.9%) said they believe lifestyle modification is necessary in their weight loss journey sometimes.

Based on the results obtained from the Chi-squared Tests, there is no association between any of the variables and weight loss because none of the P value for either of the variables was < 0.05. Thus, the weight loss program provided by the Romano Foundation Nutritional Consulting Clinic does not discriminate against age, ethnicity, education levels, income level or gender. This may be so because of the individualized diets and tests prescribed for each client, the clinic uses blood samples and recommendations of the patients' doctors to decide the foods that should be consumed by each client, their level of activity that should be carried out and gives motivation

and counsels the patient (Tull, 2012), which may account for no discrimination against neither of the demographics.

Based on the results obtained from the Binary Logistics Rgression, ethnicity is the only useful predictor of whether target weight of the patient is met or not, because the P value was found to be < 0.05 (0.028). Gender, age, education level and income do not predict whether a patient is able to lose weight or maintain weight loss because none of the P values were significant, all were found to be > 0.05. This may have been this way because weight loss does not discriminate against gender, age, education level or income, but by ethnicity as mentioned by Mahan, 2012.

The logistics from the Multivariate Regression Analysis show that no variable except age determines the time taken to lose weight; this is so because the P value was found to be < 0.05 (0.024), all the other variables' P values were > 0.05. In table 6 it can be seen that older people lost weight faster than younger people**.** This may have been the case because the older patients may have been able to lose more weight in the program due to increased time to exercise, increased time to prepare meals and little worries about daily work and life (Nelms et al. 2011)

In conclusion, based on previous studies, an increasing number of people worldwide are obese or overweight, and being overweight increases the risk of developing chronic diseases. Many who lose weight eventually regain most of the lost weight and although much research has focused on behaviors that lead to weight loss, less research is available on weight loss maintenance (Nelms et al. 2011). Data are scant on behavioral strategies related to maintaining weight loss whilst one widely accepted idea is that successful and sustainable weight loss requires paying attention to energy intake (eating) and energy output (exercising) (Mahan et al.

2012). It can be seen from this study that weight loss and weight loss maintenance by the clients of the Romano Foundation Consultancy Clinic embrace dietary, physical activity and behavioural changes in order to achieve their desired weight loss.

Limitations

The study had several limitations that may have inadvertently affected the findings of the research. Some of these limitations are as follows

- All respondents were patients of the Clinic thus may have been exposed to same treatment.
- The researchers were met with various time constraints resulting in a reduced period of data collection
- The research questionnaire may have been bias due to the researcher having worked at the clinic and knowing the techniques of the Dieticians.
- The method of sampling was a non probability method and thus each client within the clinic population were not given an equal chance of selection thus increasing the chances of bias in selection
- The researchers were met with financial constraints
- Researchers were members of the study population, thus there was increased chance of bias in selection and reporting.
- Diets varied to each client, so diets were not able to be used in the study.

Recommendations

- Firstly it is recommended that this research be repeated within the general population to establish reliability of findings as well as validity.
- To the authorities of the country, it should be recommended that a lifestyle intervention among the citizens be initiated. This should specifically address the type and amount of foods being consumed and physical inactivity of the citizens.
- Additionally it is recommended that steps be taken to alter the eating environment throughout the country to encourage healthier food choices among citizens.

Conclusion

In the Caribbean, namely, Trinidad and Tobago, there is an increase in the number of people who are obese and overweight. Many individuals who lose weight eventually regain most of the lost weight and although much research has focused on behaviors that lead to weight loss, less research is available on weight loss maintenance (Nelms et al. 2011). It is advised that caloric intake be monitored and physical activity be carried out in periods over 45 minutes at least 3 times weekly in order to lose weight, weight maintenance can be monitored and encouraged by constant support and motivation by family and friends.

Behavioral modification often involves behavioral strategies that reinforce changes in diet and physical activity; it can include becoming educated about food preparation, label reading, and self-monitoring of diet and physical activity. Many diet regimens incorporate behavioral modification strategies to help people build confidence in their ability to modify their eating and physical activity behaviors because confidence in one's ability to take action and overcome barriers is believed to be an important personal factor in behavior change

This study showed that all three factors; dietary changes, physical activity and behavioural modification are all important to members of the Romano Foundation Nutritional Consultancy Clinic in losing weight and maintaining weight loss. The study also showed that there was no association between individuals who have lost and maintained weight and individuals who have lost but did not maintain weight loss while on The Romano Foundation weight loss program. Additionally, it was proven that age is the only predictor of meeting the target weight by the clients and ethnicity was the only predictor of weight loss. It should also be noted that tests

proved that the Romano Foundation does not discriminate against gender, age, ethnicity, education level or income level.

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APPENDICES

Personal Questions

Interview number : …….

(1) Gender
Male [ ] Female [ ]

(2) Age
18-25 [ ] 26-30 [ ] 31-40 [ ] 41-50 [ ] 51-60 [ ] 61 & over [ ]

(3) Ethnicity
Indian [ ] African [ ] Chinese [ ] Caucasian [ ] Mixed [ ]

(4) Present Weight (in pounds)
110-120 [ ] 121-140 [ ] 141-160 [ ] 161-180 [ ] 181-200 [ ] 201-220 [ ]
221-240 [ ] 241-260 [ ] 261-280 [ ] 281-300 [ ] 301-320 [ ] 321 & over [ ]

(5) Education Level
Primary [ ] Secondary [ ] Tertiary [ ] Vocational [ ] None [ ]

(6) Income
Below $ 500 [ ]
$ 500-$2000 [ ]
$2001-$4000 [ ]
$4001-$6000 [ ]
$6001-$8000 [ ]
Over $8000 [ ]

Dietary Questions

(1) Were the foods that you usually consume difficult for you to give up?
Yes [ ] No [ ] Sometimes [ ]

(2) Do you dislike the dietary changes that you have to make in order to lose weight or maintain weight loss?
Yes [ ] No [ ] Sometimes [ ]

(3) Was the change in diet difficult for you to adapt to?
Yes [ ] No [ ] Sometimes [ ]

(4) Have you ever had success with Low Carbohydrate diets?
Yes [ ] No [ ]

(5) Do you use specific weight loss recipes as part of a healthy diet plan?
Yes [ ] No [ ] Sometimes [ ]

(6) Did the diet modification change your life in a good way?
Yes [ ] No [ ]

(7) Did the weekly digital acupuncture help to decrease your appetite?
Yes [ ] No [ ]

(8) Do you snack daily?
Yes [ ] No [ ] Sometimes [ ]

(9) Do you know and understand how to read food labels?
Yes [ ] No [ ]

(10) Do you eat food in correct proportions?
Yes [ ] No [ ] Not sure [ ]

(11) Do you eat breakfast, lunch and dinner on a timely and regular basis?
Yes [ ] No [ ] Sometimes [ ]

Physical Activity Questions

(1) Are you currently involved in some type of physical activity on a regular basis?
Yes [ ] No [ ] Sometimes [ ]

(2) Do you prefer endurance exercise over strength exercise?
Yes [ ] No [ ] Sometimes [ ]

(3) Do you work out early in the morning?
Yes [ ] No [ ] Sometimes [ ]

(4) Aside from diet and physical activity, have you done any other activity to assist in using weight?
Yes [ ] No [ ]

(5) Was the increase in exercise difficult?
Yes [ ] No [ ] Sometimes [ ]

(6) Is your physical activity exercise carried out over 40 minutes?
Yes [ ] No [ ] Sometimes [ ]

(7) Do you enjoy exercising?
Yes [ ] No [ ]

Lifestyle Questions

(1) Were you uncomfortable with your body before dieting?
Yes [ ] No [ ] Sometimes [ ]

(2) If yes to question 1, did this lead to your weight change?
Yes [ ] No [ ]

(3) Did you have to change your mind set in order to lose and maintain weight loss?
Yes [ ] No [ ] Sometimes [ ]

(4) Was it easy to manipulate your mind to facilitate your lifestyle modification?
Yes [ ] No [ ] Sometimes [ ]

(5) Did your family support and adapt to your lifestyle modification easily?
Yes [ ] No [ ] Sometimes [ ]

(6) Have you ever been successful with general weight loss plans and kept the weight off?
Yes [ ] No [ ]

(7) Do you keep up with current facts about obesity and modern nutrition?
Yes [ ] No [ ]

(8) Have you been on more than two diets over the past year?
Yes [ ] No [ ]

(9) Do you know what a balanced meal consists of?
Yes [ ] No [ ]

(10) Do you believe you are well-educated in the nutrition field to carry out daily eating routines without a diet sheet to follow?
Yes [ ] No [ ]

(11) Were you diagnosed with any type of chronic disease related to having excess weight?
Yes [ ] No [ ]

(12) Did you believe initially that losing and maintaining weight was possible for you?

Yes [ ] No [ ]

(13) Have any major life events occurred which made you gain weight?

Yes [ ] No [ ]