A Study on to find the prevalence of obesity among the adult general population of Hafar - Albatin Region, Saudi Arabia

Correspondence authors: by

Dr Nasser Turki Aldhafeeri- Dr Salman Fahad Aldhafeeri

(Hafr Al Batin Health, KSA)

Authors contributions
 This work was carried out in collaboration among all authors. All read and approved the final manuscript

Abstract

Background: Obesity is a worldwide phenomenon, the percentage of obesity in the kingdom of Saudi Arabia is about 33.7 and is 41 per cent by the end of 2030. Obesity has negative influences on the body's health by raising the cholesterol level and its risk to the heart causing cardiovascular diseases. Nearly 2.3 billion adults will become overweight & above than 700 million were obese in 2015. The World Health Organization declared obesity a global epidemic, and as the WHO estimates in 2008, 1.5 billion adults (20 years and more) are overweight, above 200 million men & nearly 300 million women were suffering from obesity.

Aims: The main objective of this study is to determine the prevalence of obesity among the general population of the Hafar - Albatin region, Identifying the lifestyle of the adult population in the Hafr - Albatin region, Kingdom of Saudi Arabia, who are overweight or obese, Comparing the lifestyle of the adult population who are overweight or obese with the lifestyle of the population with normal weight.

Methods: A cross-sectional study was conducted, and the data was collected from the Hafr - Albatin population, by using the self-study tool Data were analyzed using Microsoft Excel 2016, and SPSS v 21.0 software was used for statistical analysis.

Keywords; *Obesity, Overweight*, Hafar Al batin

Chapter 1

Introduction

Obesity is considered a worldwide phenomenon of interest to a lot of researchers in different fields, particularly healthcare professionals, that is due to its relationship to a lot of medical physical issues. The Kingdom of Saudi Arabia has fifteenth in the world in terms of obesity, and the percentage of general obesity in the Kingdom is about 33.7% in 2016 [Alqarni,2016] and it would be 42% in 2030. [Bouraoui,2019]

Scientific evidence and evidence point to the significance of physical activity for human psychological and physical health, and to the risk of physical inactivity on health & bodily functions, because its negative influence on society outweighs those negative influences by it due to elevated cholesterol in the blood or an elevation in arterial blood pressure or The smoker's percentage, due to the life variations that the industrialized world witnessed in the second half of the last century and the consequent noticeable elevate in diseases related to contemporary lifestyle, involving diabetes, osteoporosis, obesity and heart diseases.[Allison,1999]

In 1997, the World Health Organization declared obesity a global epidemic, and as the WHO estimates in 2008, 1.5 billion adults (20 years and more) are overweight, above 200 million men & nearly 300 million women were suffering from obesity.

 Nearly 2.3 billion adults will become overweight & above than 700 million will be obese in 2022. [WHO,2014] for adolescents aged (15-19) years & suffering with overweight, the percentage is between (21%) & (36%), and the highest levels of obesity among adolescents in 2007 were present in the four southern European countries, that are Greece and Spain, Italy and Portugal, with Ghent are the English-speaking countries of the United Kingdom, Canada and the United States. The overweight phenomenon & obesity is elevating significantly among adults in the

Eastern Mediterranean area. Data on adults aged 15 years & over from 6 countries in the region show the highest levels of overweight & obesity in Jordan, Egypt, Kuwait, Bahrain, Saudi Arabia & the Arab Emirates despite the various levels of obesity. Income between them, as the prevalence of obesity in the countries, ranges from (74%) to (86%) among women, and from (69%) to (77%) among men. These data show a higher prevalence of obesity among adult women, as weight gain is more remarkable in adults than in men. [WHO,2014]

1. Problem statement

The continuous escalation in the rate of obesity among children, adolescents, and adults of various ages, social, and economic groups in most developed and developing countries is the same, and the resulting escalation in the incidence of chronic lifestyle diseases linked with overweight and obesity, and deaths that result from imbalance Body weight has put obesity, according to estimates by the World Health Organization, at the top of the list of global health issues as a global epidemic, a chronic disease, and a threat to a lot of countries in the world.

The age-adjusted prevalence of obesity was **35.5%** in KSA with an overall prevalence of 35.6% [95% CI: 34.9-36.3], while severe (gross) obesity was 3.2%. Females are significantly more obese with a prevalence of 44% than males at 26.4% ($p<0.0001$). (20) Over 4 million people died each year because of being overweight or obese in 2017 according to the global burden of disease. The prevalence of overweight or obese children and adolescents aged 5–19 years increased more than four-fold, from 4% to 18% globally. Overweight and obese people account for more than 60% of the total population of Saudi Arabia [Bouraoui, 2019]. A recent study revealed that a whopping SR500 million per year was spent by people suffering from obesity in the kingdom on treatment. Almost all age groups are affected in general and adults in particularly

2. Research objectives

The main objective of this study is to try to understand overweight & obesity from

a social perspective.

3.1- Specific objectives:

1. 1. To determine the prevalence of obesity among the general population of the Hafr-Albatin region.

2. 2. Identifying the lifestyle of the overweight or obese adult population in the Hafr-Albatin region of the Kingdom of Saudi Arabia.

3. 3. contrast the lifestyles of adults who are overweight or obese with those of adults who are normal weight

4. 4. Recognize the relationship between the lifestyle of the adult population and their obesity.

4- Research questions

In light of the study issue and its objectives, the researcher will try to answer the following questions:

1) What is the lifestyle of the adult population in the Hafr - Albatin area who are overweight or obese?

2) Are there variations in the lifestyle of the adult population in the Hafr - Albatin region who are overweight or obese?

3) Is there a relationship between the lifestyle of the adult population in the Hafr - Albatin region, which is represented in their social & economic status, and their overweight or obesity?

4) Is there a relationship between the lifestyle of the adult population in the Hafr - Albatin area, which is represented in food habits, and being overweight or obese?

Chapter 2

Literature review

Approximately 1.2 billion people in the world are overweight, and at least 300 million of them are obese.

According to the World Health Organization, obesity is one of the 10 most preventable health risks. Obesity is associated with disorders such as hypertension, diabetes, hypercholesterolemia, and liver disease. Obesity has been thought to simply be related to an imbalance between energy intake and expenditure. However, more recent research has suggested that genetic, physiological, and behavioural factors also play a significant role in the aetiology of obesity. Thus, the management of obesity through exercise, nutrition, supplementation, and medical intervention is at the forefront of research. [Coli,2005].

Overweight and obesity result from excessive accumulation of fat in the body [Waxman,2004] and are associated with increased risk of non-communicable diseases such as cardiovascular diseases, diabetes, cancers, and other health-related complications [Fruh,2017].

In 2005, 30.0% of the world's adult population was overweight or obese, with this value estimated to almost double by 2030. The World Health Organization (WHO) estimated that about two billion and 600 million adults worldwide were overweight and obese in 2014, respectively [WHO, 2015].

Although overweight and obesity are more common in economically developed countries, developing countries have been projected to have a much larger proportional increase in the number of overweight and obese individuals between 2005 and 2030

[Kelly,2005]. Over the past 30 years, being overweight or obese has become one of the world's leading health concerns. A recent report by the Organization for Economic Co-operation and Development (OECD) observed through epidemiological studies that overweight and obesity have reached high enough proportions to be classified as a global epidemic [Rask,2013].

High body mass carries with it an increased risk of the development of several serious cardiovascular and metabolic diseases, such as type 2 diabetes, hypertension, dyslipidemia, stroke, osteoarthritis as well as several different forms of cancer e.g., prostate, endometrial, breast as well as colon cancer [Insel,2002]. For several of these diseases, such as dyslipidemia and related cardiovascular diseases, there is a clear link between body adiposity and disease. For osteoarthritis, the increased load on weight-bearing joints is believed to be the culprit. However, non-weight-bearing joints are also affected. For other diseases, such as cancer, the links to high body mass are less clearly defined [Odea, 2003].

Chapter 3
METHODOLOGY

❖ **Study design**

A descriptive cross-sectional study design was planned to conduct this study.

v **Study setting**

This study will be performed on residents of the Hafr-Albatin area, Kingdom of Saudi Arabia.

v **Study population**

Residents of the Hafr-Albatin area, Kingdom of Saudi Arabia.

v **Study period**

The study will be extended from 10/11/2022 to 20/11/2022

v **Sampling technique**

The convenience Sampling technique will be to be applied

v **Sample of the Study**

The sample size was 250 males and females in the Hafr-Albatin regions who were ready to participate in the study period.

Inclusion criteria:

 adult population (more than 20 years old).

· Both genders

· People who are living in the Hafr - Albatin region for more than one year

· People who are willing to participate and give informed consent

Exclusion criteria:

- Less than 20 years were excluded
- Those who are bedridden were excluded
- Those who are on Steroid treatment or Cancer treatment were excluded
- Those who are chronic kidney diseases and dialysis were also excluded

v **Data collection methods:**

A questionnaire and statistics. The data was gathered from the population in Hafr-Albatin city on October 30, 2022. The study instrument was self-designed and pretested. The instrument was revised by the expert supervisor, a questionnaire was translated into Arabic.

v **Data analysis:**

The data were collected using Microsoft Excel 2016 (Microsoft Corporation, New York, USA) software; SPSS v 21.0 (IBM Analytics, New York, USA) software was used for the statistical analysis. Descriptive statistics were displayed as proportions, means, and appropriate statistical tests.

v **Research tools:**

Self-administered questionnaire: The standardized data collection in an English-language questionnaire will be developed using the previous study evidence for the population.

The questionnaire will be reviewed by the supervisor after validation, it will be translated into the Arabic language and back-translated to check the validity of the meaning of the questions. The questions are designed to gain quantitative data on personal and demographic characteristics (age, level of education, family history). Questions about obesity, determinants, prevention, complication & treatment

This study used the Center for Disease Control and Prevention (CDC) BMI category status, BMI below 18.5 kg/m2 as underweight, from 18.5 to 24.9 kg/m2 as normal-weight, from 25 to 29.9 kg/m2 as overweight, and 30 kg/m2 and above as obese [Althumiri, et al.2021]

v Statistical Analysis

The data will be collected and organized by the researcher in MS Excel, and then exported to the Statistical Package for Social Science (SPSS) version 21 to be analyzed according to the objectives. Both dependent and independent variables will be displayed as frequency tables and figures.

v Ethical requirement

The researcher will obtain informed consent after explaining the objectives and purpose of the study. The researcher assured the privacy and identity of the study participants would be maintained confidentiality. No compensation will be given as this study is only a survey based and no harm or injury will cause.

Chapter 4
Results

Demographic data

a- Categorical data

Table no (1) Demographic data (categorical data)

	Categories	Frequencies	Per cent
Sex	Male	161	64.4
	Female	89	35.6
Marital status	Single	84	33.6
	Married	159	63.6
	Divorced/widowed	7	2.8
Educational level	PHD	2	8
	Master	12	4.8
	Bachelor	146	58.4
	Diploma	90	36
With whom are you living	Alone	12	4.8
	Family	228	91.2
	Friends	10	4

b- Quantitative data

Table no (2) Demographic data (quantitative data)

Variables	Mean	Standard deviation
Age	33.97	10.799
Weight	76.34	14.956
Height	166.61	16.491

The results showed the respondents are 250, 64.4% are male, 35.6% are female, marital

status 33.6% are single, 63.6% are married, 2.8% are divorced/ widowed, about educational level there are 58.4% having a bachelor, 36% having a diploma, 4.8% having master, and 8% having PhD, and from the respondents, there are 91.2% are living with their families, 4.8% are living alone, and 4% are living with their friends, their age mean = 33.97 with 10.799 standard deviations, the weight mean = 76.34, with standard deviation = 14.956, and the height means = 166.61 cm, with standard deviation = 16.491

Medical history

Table no (3) frequency of medical history variables

Variables	Categories	Frequencies	Per cent
Obesity history	Yes	87	34.8
	No	163	65.2
Disability	Yes	50	20
	No	200	80
Chronic disease	Hypertension	7	2.8
	CVD	8	3.2
	Diabetes	10	4
	Kidney problems	1	0.4
	Other	17	6.8
	None	207	82.8
Chronic effect on physical activity	Yes, encourage me to practice it	23	53.5
	No, discourage me from practising it	12	27.9
	No, it does not	8	18.6

The results showed there are only 34.8% have a medical history of obesity in their families, there are 20% have a disability, about chronic disease there are 17.2% have a

chronic disease (hypertension (2.8%), CVD (3.2%), diabetes (4%), kidney problems (0.4), other (6.8%), about the effect of the chronic disease on the physical activity there 53.5% from diseased people with chronic disease these diseases encourage them to practice it, 27.9% discourage them to practising it, 18.6% no effect

Physical activity

Table no (4) frequency of physical activity variables

Variables	Categories	Frequencies	Per cent
Physical activity	Yes	119	47.6
	No	131	52.4
Type of Activity	Exercise	88	74
	Walking/cycling	24	20
	Swimming	7	6
Time spent in the activity per day	15-30 min	48	40.3
	1 hour	45	37.8
	2 hours	21	17.3
	More than 2 hours	7	5.6
Cause of no practice activity	No time to practice	19	14.7
	No designated place to practice	32	24.8
	Work pressure	23	17.8
	Family pressure	24	18.6
	Not interested in practising	31	24

The results showed there are 47.6% are practising physical activity (exercise (74%), walking/cycling (20%), swimming (6%), 40.3% from them spent 15-30 min per day, 37.8% spent 1 hour per day, 17.3% spent 2 hour per day, 5.6% spent more than 2 hours

per day, about the causes of no practising activity 24.8% they have no designated place to practice, 24% they are not interested in practising, 18.6 % due to family pressure, 17.8% due to work pressure, 14.7% they have no time to practice

Obesity prevalence

Table no (5) frequency of obesity and normal weight

Variables	Categories	Frequencies	Per cent
Obesity	Overweight	163	65.2
	Normal	87	34.8

The results showed the prevalence of obesity is 65.2%

Lifestyle

Table no (6) frequency of lifestyle variables

Variables	Categories	Frequencies	Per cent
Smoking	Yes	50	20
	No	200	80
Number of cigarettes/days	1-10	26	52
	11-20	13	26
	More than 20	11	22
Years of smoking	Less than 1 year	4	8
	1-5 year	18	36
	More than 5 years	28	56
Meals /day	Less than 3 meals	100	40
	3 meals	102	40.8
	4-5 meals	44	17.6
	More than 5 meals	4	1.6

Breakfast daily	Yes	110	44
	No	140	56
Fast food	Yes	70	28
	No	46	18.4
	Sometimes	92	36.8
	Rarely	42	16.8
Sleep at night	Yes	191	76.4
	No	59	23.6
Khat or tobacco	Yes	76	30.4
	No	174	69.6
Steroid/psychiatric drug	Yes	42	16.8
	No	208	83.2
Red meat	Daily	39	15.6
	2-3 times/week	104	41.6
	Less than once weekly	107	42.8
Soft drinks	Yes	135	54
	No	115	46
Energy drinks	Yes	57	22.8
	No	193	77.2
Sleep's hours	Less than 6 hours	94	37.6
	6-8 hours	156	62.4
Vegetables Irregular Follow up for weight	Daily	65	26
	2-3 times a week	95	38
	Less than once a week	42	16.8
	Rarely	48	19.2
	Yes	113	45.2

	No	137	54.8
Irregular Medical Follow up	Every 3 months	49	19.6
	Every 6 months	36	14.4
	Every 1 year	45	18
	Every 2-5 years	120	48

The results showed about the life style of the respondents, there are 20% smoker, from them 52% smoke 1-10 cigarettes per day, 26% smoke 11-20 cigarettes per day, 22% smoke more than 20 cigarettes per day, and 56% smoke from more than 5 years, 36% smoke from 1-5 years, 8% smoke from less than 1 year, there are 40.8% take 3 meals per day, 40% take less than 3 meals, 17.6% take 4-5 meals per day, and 1.6% taking more than 5 meals, about irregular taking breakfast per day there are 44% take irregularly, and 56% are not, there are 28% take fast food, 18.4% don't take fast food, 36.8% take sometimes, 16.8% rarely take, there are 76.4% sleep at night , 23.6% are not, there are 69.6% don't take khat or tobacco , 30.4% take the khat or tobacco, there are 16.8% take steroid or psychiatric drugs , 93.2% are not, about red meat eating there are 42.8% eat less than once a week, 41.6% eat 2-3 times a week , 15.6% eat daily, there are 54% drink soft drinks, 22.8% drink energy drinks, about sleep hours per day, there are 37.6% sleep less than 6 hours, 62.4% sleep from 6-8 hours, about vegetable's eating   there are 26% eat it daily, 38% eat it 2-3 times a week , 16.8% eat it less than once a week, 19.2% eat it rarely, about follow up of weight, there are 45.2% follow up their weights, and 54.8% are not, about general medical follow up there are 19.6% follow up every 3 months, 14.4% follow up every 6 months, 18% follow up every 1 year, and 48% follow up every 2-5 years

Factors related to obesity

Chi-square to assess the association between obesity and lifestyle factors

Table no (7) chi-square values of association between obesity and related lifestyle factors

Variables	Pearson chi-square	p-value
Obesity history	0.041	0.840

Disability	0.18	0.894
Physical activity	0.024	0.876
Smoking	0.282	0.595
Meals /day	0.890	0.828
Breakfast daily	0.372	0.542
Fast food	02.514	0.473
Sleep at night	1.220	0.269
Khat or tobacco	1.051	0.305
Steroid/psychiatric drug	2.424	0.119
Red meat	1.646	0.439
Soft drinks	0.290	0.590
Energy drinks	0.003	0.959
Sleep's hours	2.452	0.117
Vegetables	1.858	0.602
Irregular Follow up for weight	0.200	0.655
Irregular Medical Follow up	8.357	0..039

The results there are a significant association between body weight and irregular medical follow-up, where chi-square value =, where chi-square value =8.357, p-value = 0.039, and there is no significant association with other factors where p-value for all factors > 0.05

Table no (8) Comparison between the lifestyle of normal weight and obese

Variables	Categories	Obese (%)	Normal (%)

Obesity history	Yes	34.3	35.6
	No	65.6	64.4
Disability	Yes	20.2	19.5
	No	79.8	80.5
Physical activity	Yes	47.2	48.3
	No	52.8	51.7
Smoking	Yes	19	21.8
	No	81	78.2
Meals /day	Less than 3 meals	38.7	42.5
	3 meals	41.7	39.1
	4-5 meals	18.4	16.1
	More than 5 meals	1.2	2.3
Breakfast daily	Yes	45.4	41.4
	No	54.6	58.6
Fast food	Yes	29.4	25.3
	No	16	23
	Sometimes	38.7	33.3
	Rarely	16	18.4
Sleep at night	Yes	74.2	80.5
	No	25.8	19.5
Khat or tobacco	Yes	28.2	34.5
	No	71.8	65.5
Steroid/psychiatric drug	Yes	14.1	21.8
	No	85.9	78.2
Red meat	Daily	16.6	13.8
	2-3 times/week	43.6	37.9
	Less than once weekly	39.9	48.3
Soft drinks	Yes	52.8	56.3

	No	47.2	43.7
Energy drinks	Yes	22.7	23
	No	77.3	77
Sleep's hours	Less than 6 hours	41.1	31
	6-8 hours	58.9	69
Vegetables	Daily	24.5	28.7
	2-3 times a week	36.8	40.2
	Less than once a week	17.2	16.1
	Rarely	21.5	14.9
Irregular Follow up for weight	Yes	44.2	47.1
	No	55.8	52.9
Irregular Medical Follow up	Every 3 months	22.7	13.8
	Every 6 months	13.5	16.1
	Every 1 year	13.5	26.4
	Every 2-5 years	50.3	43.7

The results showed that there is no clear difference between the lifestyle of normal weight and obese

The results showed the prevalence of obesity = 65.2%, there is no difference between the lifestyle of normal-weight people and who are obese, and also there is no association between lifestyle factors like smoking, eating behaviour and drinking, physical activity, diseases, sleeping and obesity except the Irregular Medical Follow up

Chapter 5

Discussion

The prevalence of obesity among older adults has increased during the past 20 years and will affect both medical and social services. Along with an increased risk of cardiovascular disease, diabetes, and several cancers, obesity is associated with an increased risk of physical and cognitive disability. However, relatively little attention has been given to the issue of weight management among community-dwelling older adults. [Houston,2009]

Intentional weight loss in obese older adults has not been widely advocated by healthcare providers due to the uncertainty of whether the benefits outweigh the risks. Limited data in older adults shows that intentional weight loss is effective in improving diabetes, cardiovascular risk factors, and physical function. The changes in body composition associated with ageing, the consequences of obesity in older adults, and the effect of intentional weight loss on chronic disease risk factors and physical function. [Houston,2009]

Recommendations for weight loss in obese older adults that minimize the likelihood of adverse effects on muscle mass, bone density, or other aspects of nutritional status are reviewed. Specific recommendations for macronutrient intake, in particular protein, and selected micronutrients, vitamin D and B-12, as well as dietary fibre and fluid intake as part of a hypocaloric diet, and recommendations for physical activity are described. As part of the health care team, dietetics practitioners need to be able to guide and manage weight loss treatment options on an individual basis by evaluating the potential benefits against the potential risks in obese older adults.

The prevalence of obesity is fast on the rise globally, a trend that began earlier in industrialized countries. In countries where substantial proportions of the population are obese, there are far-reaching implications for the current and future burden of chronic diseases such as Type II diabetes, cardiovascular disease, certain forms of cancer, and osteoarthritis.[WHO,2022]

The results showed that there was no clear difference between the lifestyle of normal weight and obesity. The results showed the prevalence of obesity was

65.2%, and there is no difference between the lifestyles of people with normal weight and those who suffer from obesity, nor is there any association except with irregular medical follow-up.

The Kingdom of Saudi Arabia is the fifteenth in the world in terms of obesity, and the percentage of general obesity in the Kingdom is about 33.7% in 2016, and it will be 42% in 2030, according to the [Bouraoui,2019] study.

The World Health Organization declared obesity a global epidemic, and as the WHO estimates in 2008, 1.5 billion adults (20 years and more) are overweight, above 200 million men & nearly 300 million women were suffering from obesity. Nearly 2.3 billion adults will become overweight and more than 700 million will be obese in 2015. [WHO,2014] For adolescents aged 15–19 years & suffering from being overweight, the percentage is between (21% & 36%), and the highest levels of obesity among adolescents in 2007 were present in the four southern European countries, that are Greece and Spain, Italy, and Portugal, with Ghent being the English-speaking countries of the United Kingdom, Canada, and the United States.

The overweight phenomenon and obesity are increasing significantly among adults in the Eastern Mediterranean area. Data on adults aged 15 years and over from 6 countries in the region shows the highest levels of overweight and obesity in Jordan, Egypt, Kuwait, Bahrain, Saudi Arabia, and the Arab Emirates despite the various levels of obesity. The income between them, as the prevalence of obesity in the countries, ranges from 74% to 86% among women, and from (69%) to (77%) among men. These data show a higher prevalence of obesity among adult women, as weight gain is more remarkable in adults than in men.

Chapter 6
Conclusion and recommendation

Conclusions

Approximately 65.2% of the people in the Hafr-Albatin region suffer from obesity, while 34.8% of the Hafr-Albatin region are of normal weight. According to the World Health Organization, obesity is one of the 10 most preventable health risks. Obesity is associated with disorders such as high blood pressure, diabetes, high blood cholesterol, and liver disease. Obesity is thought to be simply related to an imbalance between energy intake and expenditure. However, recent research has indicated that genetic, physiological, and behavioural factors also play an important role in the aetiology of obesity. Thus, managing obesity through exercise, nutrition, supplementation, and medical intervention is at the forefront of research.

Being overweight and obese result from the excessive accumulation of body fat and are associated with an increased risk of non-communicable diseases such as cardiovascular disease, diabetes, cancer, and other health complications. In 2005, 30.0% of the world's adults were overweight or obese, and this value is estimated to nearly double by 2030. The World Health Organization (WHO) has estimated that about two billion and 600 million adults worldwide are overweight or obese in 2014, respectively.

  Although overweight and obesity are more common in economically developed countries, developing countries are expected to experience a much greater relative increase in the number of overweight and obese individuals between 2005 and 2030 [Kelly, 2005]. Over the past 30 years, being overweight or obese has become one of the world's leading health concerns. A recent report by the Organization for Economic Co-operation and Development (OECD) through Epidemiological Studies notes that overweight and obesity have reached proportions high enough to be classified as a global epidemic.

Recommendations

1. The university must arrange health education awareness programmes frequently.

2. Not eating a more non-vegetarian diet like meat encourages one to eat a more fibre diet.

3. Exercise daily in the right way with a healthy integrated diet and monitor your weight weekly.

4. Try to reduce the use of drugs such as (depression, psychosis) and other drugs for mental disorders and try to solve these problems in another way, such as through relaxation and the practice of yoga.

5. Regularity in each meal at its usual time. Great attention is to be paid to breakfast, which is the most important meal of the day.

6. Sleep adequately minimum of 8hrs per day in proper regular time

7. Further research in this field should be done.

The rate of obesity is increasing every day, and modification of lifestyles should be recommended.

References

1. Allison, D.B., R. Zannolli, and K.M. Narayan, The direct health care costs of obesity in the United States. AmericanJournal of Public Health, 1999. 89(8): p. 1194-1199.

2. Alqarni, SSM. (2016), A Review of Prevalence of Obesity in Saudi Arabia, Obesity & Eating Disorders, Vol.2 No.2:25.

3. Bouraoui, O., Alnahdi, S. (2019), Modeling and forecasting Obesity-related healthcare costs using ARIMA model, 34th IBIMA Conference on 13-14 November 2019 Madrid, Spain. Conference proceedings (ISBN: 978-0-9998551-3-3, Published in the USA).

4. World Health Organization 2014, Obesity and overweight. http://www.emro.who.int/at/health-topi

5. Colin Wilborn, Jacqueline Beckham, Bill Campbell, Travis Harvey, Melyn Galbreath, Paul La Bounty, Erika Nassar, Jennifer Wismann, and Richard Kreider. Obesity: Prevalence, Theories, Medical Consequences, Management, and Research Directions, Journal of the International Society of Sports Nutrition. 2(2): 4-31, 2005. (www.sportsnutritionsociety.org)

6. Fruh SM. Obesity: risk factors, complications, and strategies for sustainable long-term weight management. J Am Assoc Nurse Pract. 2017;29: S3–14.

7. World Health Organization (WHO). Obesity and overweight:... – Google Scholar. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q= World+Health+Organization+%28WHO%29.
+Obesity+and+overweight%3A+ Factsheet. +2015. +&btnG=.

8. Kelly T, Yang W, Chen C-S, Reynolds K, He J. Global burden of obesity in 2005 and projections to 2030. Int J Obes. 2008; 32:1431–7. https://doi.org/10.1038/ijo.2008.102.

9. Rask-Andersen, M. 2013. Obesity Genetics: Functional Aspects of Four Genetic Loci Associated with Obesity and Body Mass. Acta Universitatis Upsaliensis.

Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine 921. 48 pp

10. Insel, P., & Roth, T . (2002). *Core Concept in Health.* Boston: McGraw Hill

11. O'dea, J. (2003). *Overweight and Economic Factors* Retrieved from. www.childsource.com/obesity

12. Pangrazi, R. P. (1995). Dynamic Physical Education for Elementary School Children. Allyn: Bacon publishers

13. Kai-ming, C. (1998). *Sport and Children, WHO Collaborating Center for Sports Medicine and Health Promotion.* Hong Kong: University of Hong Kong Press

.

14. Newbold, R. (2004). *Overview of Clinical Perspectives and Mechanisms of Obesity* in *Developmental Origins and Environmental Influences*. Duke: Duke University

15. Gavin, M. (2005). O*verweight and Obesity*, www.childhealth.org/parents/general

16. Retrieved on Friday, 26th January 2007

17. Ekblom, O. (2005). *Physical Fitness and Overweight in Swedish Youths.* Stockholm: Reprorint AB

18. Johnson, E. (2002). Prevalence and Trends of Overweight and Obesity among US Children and Adolescents. Retrieved from ww.cdc.gov/nchs/products/overweight

19. Body mass index - BMI. 2019. http://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy-lifestyle/body-mass-index-bmi. Accessed 7 Apr 2022.

20. Althumiri NA, Basyouni MH, AlMousa N, et al. Obesity in Saudi Arabia in 2020: Prevalence, Distribution, and Its Current Association with Various Health Conditions. Healthcare (Basel). 2021;9(3):311. Published 2021 Mar 11. doi:10.3390/healthcare9030311.

21 -AlQuwaidhi, A. J., Pearce, M. S., Critchley, J. A., Sobngwi, E., & O'flaherty, M. (2014). Trends and future projections of the prevalence of

24

adult obesity in Saudi Arabia, 1992-2022. *Eastern Mediterranean Health Journal*, *20*(10).