An- Najah National University

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Knowledge, Attitude and Practice Regarding Dietary Fiber Intake Among Palestinian Adolescents in The West bank

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Dedication

This thesis is dedicated to my father, who taught me that the most invaluable knowledge is the one which is learned for its own sake. What's more, he enlightened me that the largest task can be accomplished only if it is done one step at a time.

Acknowledgment

The realization of this work was only possible due to several people's collaboration, to which I want to express my gratefulness. Firstly, to Dr. Manal Badrasawi, my supervisor, I am grateful for the trust deposited in my work and for the motivation demonstrated along this research journey, she supported me with no doubt to my dedication in this investigation. Furthermore, I would like to express my gratitude for her feedback and help in the interpretation of some results given in this thesis. Secondly, to my sister, for her support that gave me enthusiasm and encouragement. Finally, to my parents and my brothers, for their true love which has always been a driving factor towards completing this work.

الإقرار

انا الموقع أدناه مقدم الرسالة التي تحمل عنوان:

Knowledge, attitude and practice regarding dietary fiber intake among Palestinian adolescents in the West Bank

أقر بأن ما اشتملت عليه هذه الرسالة إنما هي نتاج جهدي الخاص، باستثناء ما تم الإشارة اليه حيثما ورد، وأن هذه الرسالة ككل، أو أي جزء منها لم يقدم لنيل أي درجة أو لقب علمي أو بحثي لدى أي مؤسسة تعليمية أو بحثية أخرى.

Declaration

The work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for and other degree or qualification

اسم الطالب: Student's Name:

التوقيع: Signature:

التاريخ: Date:

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List of Abbreviation

IOM: The Institute of medicine
RS: Resistant starch
AOAC: The association of Official Analytical Chemists
GI tract: gastrointestinal tract
CHD: Coronary heart disease
CVD: Cardiovascular disease
MW: Molecular weight
USA: United States of America
BMI :Body mass index
WHO: World Health Organization
FFQ: Food frequency questionnaire

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Abstract

There is documented evidence that correlates obesity and non-communicable diseases with poor food choices and sedentary lifestyles among adolescents worldwide. Low intake of fruits and vegetables, high consumption of fast food, and low dietary fiber consumption are among the reported food choices. Despite the documented health benefit of dietary fiber consumption; the awareness about the importance of dietary fiber in health is poorly studied and reported among Palestinian adolescents. This study aims to determine the level of knowledge, attitude, and practice about dietary fiber among Palestinian adolescents in governmental schools in the West Bank, and to identify the associated factors that may influence their cognizance and practices.

Methods

A total of 818 school adolescents were randomly selected from 5 different districts in the West Bank: Nablus, Salfit, Jenin, Tulkarm, and Hebron. The main age of the targeted participants was 14.26±0.79 ranged (13- 15) years.

Moreover, a newly developed validated questionnaire was used to determine the level of knowledge (16 MCQ), attitude (3 levels Likert scale, 14 items), and dietary fiber practices (3 levels Likert scale, 10 items). Furthermore, Socio-demographic data, medical history, and lifestyle were collected. Nutritional status assessment was performed by using anthropometric measurements. Obesity, overweight, normal weight, and underweight were defined using using the World Health Organization cut off points. Face and content validity was done for the newly developed questionnaire, followed by a pilot study. The reliability test showed acceptable Cronbach alpha; knowledge items 0.82, attitude 0.69, and practices 0.72.

Results

This study showed an insufficient score of knowledge, in which the overall mean of the nutrition knowledge score was (7.04 ±2.45) out of 16.

Nutrition knowledge was significantly associated with gender, economic status, and father's education level. The mean knowledge score was significantly (p= 0.007) higher among females (7.26 +2.35) than in males (6.79+2.54). A statistically (p=0.031) lower level of knowledge was

associated with students who came from low-income families (6.65±2.65). Students who have highly educated parents scored significantly (p= 0.00) higher levels in fiber-related knowledge as compared to other groups (7.49+2.46). There was a notable relationship between the four items of dietary habits and gender, for instance, males showed significant dietary habits such as eating regular meals (p=0.02), eating breakfast daily (p=0.00), and drinking enough water more than ten cups (0.05) compared to females.

There was no vital relationship between the weight status indicated by BMI and dietary knowledge or practices, nor was there a significant relationship between the total score of knowledge and dietary practices except in two items. However, there were significant differences between males and females in fiber-related dietary practices and attitudes. What's more, there was a significant relationship for most items of attitude and knowledge, also a significant relationship with three items of fiber-related knowledge and practices.

Conclusion

The study revealed overall insufficient knowledge about dietary fiber, with a statistically significant higher level among females as compared to males. The dietary habits of the study sample showed a considerable prevalence of unhealthy dietary practices.

Chapter One

Introduction

1.1. Background:

Adolescence is a transitional stage of development that occurs at puberty to adulthood. According to the World Health Organization, Adolescents are defined as individuals between 10 and 19 years of age (1). This period in the life cycle is divided into three categories according to Lancet's commission on adolescent health: early adolescence from (10-14) years, late adolescence from (15-19) years, and young adulthood from (20-24) years (2). In 2012, a quarter of the world's population consisted of adolescents and young adults (3).

Adolescence is a critical period of rapid physiological, neurological, sexual, and behavioral changes (4). A tremendous amount of growth is marked during puberty in both genders, in which weight gain usually occurs in this period. The mean of weight gain ranges from 3-9 kg/ year with a significant increase in the lean body mass (5). Peak bone mass is also achieved during this period; skeletal growth is one of the most marked characteristics of puberty (6,7). These changes in the height and weight necessitate an increase in the nutritional requirements, which highlight the need to focus on the sufficient intake of nutrients, total energy requirements, macronutrients, and micronutrients to achieve a healthy development (8); however, failure to obtain optimal nutrition leads to delay in growth (9). In this vein, this transitional period needs critical care more

than childhood and adulthood because it forms a strong effect on health, and productivity in future growth (10, 11).

Most adolescents in the world are born in countries with multiple health problems including under nutrition, poverty, poor sexual and reproductive health, and non-communicable diseases (1). There was a lack of focus on adolescent health among the global initiative. However, recently, there is an increasing interest in adolescent health. For instance, there was a launch of a Lancet Commission on adolescent health and wellbeing, which included youth health advocates, policymakers, and a network of academics (12). This increase in the global interest in adolescent's health occurred due to two main reasons. Firstly, there is a documented relationship between early nutrition and risk for chronic illness in later life. Secondly, adolescence has also been detected as a potential stage to correct the insufficient growth and nutritional inadequacies from childhood (13).

In this age group, nutritional research shows the spread of insufficient dietary habits, such as high intake of processed or sugary food, long gaps between meals, and low consumption of fruits and vegetables (14). Dietary intake during this period may have long term health consequences. For example, fat intake during adolescence increases the risk of coronary heart disease, low dietary calcium intake leads to low bone density in adolescents as well as the possibility of osteoporosis later in life, and being overweight

as an adolescent is associated with being overweight as an adult (15).

A study which was conducted in Seven Arabic countries by Musaiger and colleagues (2013), reported that the dietary behaviors of Arabian adolescents are characterized by low intake of milk, fruits, vegetables, high intake of sugar-sweetened beverages, and fast food. These unhealthy food choices all are strongly related to a higher incidence of chronic disease and obesity (16).

Dietary fiber refers to food components found mainly in fruits, vegetables, and cereals, then the fibers are partially fermented in the large intestine. Fibers can be classified into two groups: water-soluble and water-insoluble fibers. Moreover, dietary fiber structurally can be classified into many different types which are arabinoxylan, inulin, pectin, bran, cellulose, B-glucan, and resistant starch (17).

The importance and effect of fiber for the normal function of the digestive system have been long appreciated (18). Global reports published in 2000, showed that 1.8% of all diseases worldwide and 2.7% million deaths could be attributed to an insufficient amount of fruits and vegetables (19).

While adolescents compose about 32% of the total population in Palestine, studies targeting nutritional status and dietary habits with their relationship to general health are sparse (20). Up to our knowledge, no published studies to determine the level of fiber intake or to determine the level of awareness about the health effects of dietary fibers among Palestinian

adolescents have been identified after reviewing major science and medical databases using different keywords. Taking this into consideration, this study is the first study that determined the knowledge about dietary fiber, dietary practices, and the adolescent's attitude toward dietary fiber in the Palestinian context.

1.2. Objectives:

1.2.1. General Objective

This study aims to determine the knowledge, attitude, and practice regarding dietary fiber among Palestinian adolescents.

1.2.2. Specific Objectives

1. To determine the knowledge about dietary fiber among Palestinian adolescents in the West Bank.
2. To find out the dietary practices related to fiber intake among Palestinian adolescents.
3. To discover the attitudes regarding dietary fiber among Palestinian adolescents.
4. To determine the relationship between dietary fiber intake and nutritional status among Palestinian adolescents.
5. To analyze the differences in the fiber-related knowledge and practices among the subgroups: males and females, village and cities, age, and economic status.

1.3. Significance of The Study:

This study provides important and comprehensive data regarding the dietary fiber intake among Palestinian adolescents, in terms of knowledge, practices, and attitudes. The study will also highlight the relationship between obesity and dietary practices related to fiber intake among the study sample. In order to enhance dietary fiber intake and awareness among the various age groups, the results of the study will be used as a guide for future nutrition education programs. This research will fill the knowledge gap among this age group between the level of fiber intake and the level of intake that met the dietary recommendations and guidelines.

1.4. The Hypothesis:

The study hypotheses are summarized as the following:

The level of dietary fiber-related knowledge is low among Palestinian adolescents.

1. The dietary practices related to fiber intake are associated with obesity and overweight.
2. The attitude of Palestinian adolescents regarding dietary fiber is negative.
3. There are significant differences in dietary fiber knowledge, practices, and attitude among gender, living area, and socio-demographic variables.

Chapter Two

Literature Review

2.1. Dietary Fiber: Definition

In 1953, the definition of dietary fiber was used by Hipsley as the components of the plant cell wall which is non-digestible. Since that time, the concept has been developed, and now many slightly different definitions coexist (21). The term dietary fiber was used by Trowell et al (1972). It is defined as "the skeletal remains of plant cells that are resistant to hydrolysis (digestion) by enzymes of man. Later, in 1976, it was found that other plant components also resisted digestion, e.g. Pectin, gums, mucilage (22). Some definitions depend on its physiological effects; others define fiber according to analytical methods used for isolating fiber. Different types of fiber such as hemicellulose, lignin, pectin, cellulose were measured as chemical components. Nowadays, the United States uses an "analytical technique to detect what is considered as fiber or not for using it on food labels" (23). In 2001, the Institute of Medicine (IOM) compared "dietary fiber and added fiber, dietary fiber composed of lignin and non-digestible carbohydrates that are intrinsic and intact in plants" with "added fiber composed of isolated, non-digestible carbohydrates that have different physiological effects in humans, both added fiber and dietary fiber"(24).

Over the years, the concept of dietary fiber has been developed. Codex Alimentarius Alinorm defines the dietary fiber as carbohydrate polymers

consisting of three or more monomers, which are not hydrolyzed by digestive enzymes or absorbed in the human intestine (25).

2.2. Dietary Fiber Components and Structure:

The plant cell wall is the main source of dietary fiber which is composed of pectin substance, hemicellulose, cellulose, water, and non-carbohydrate components (e.g. pectin and lignin the amount of these constituents depend on the function, type, and maturity of plant tissue (26 & 27). Dietary fiber can be fragmented into several parts. The separation of these parts illustrates how fiber works and protects us against certain diseases (28).

2.2.1. B-Glucans

B-glucans are non-starch polysaccharides, which are found as structural compounds of the cell wall of grains such as wheat, oats, and mushrooms. B-glucans can be soluble or insoluble. Soluble viscous B-glucans is composed of B-(1,3)/1,6-D linked glucose, whereas insoluble B-glucans fiber is composed of B (1,3/1,4)-D linked glucose monomers (29).

2.2.2. Cellulose

Cellulose is a polymer consisting of linear D-glucose with beta -1,4-glycosidic bonds which are composed of up to 10000 pyranosidic residues. Cellulose is insoluble in most solvents. The most fiber in cereal bran is cellulose (26&30).

2.2.3. Hemicellulose

These are polysaccharides, in which their backbones are composed of glucose units with B-1,4glucose linkage. Its molecular weight is less than cellulose, it is found mainly in cereal and grains (30).

2.2.4. Pectins

Pectins are found in cell walls and intracellular tissue of vegetables and fruits such as potatoes and sugar beet. Pectins are composed of galacturonic acid and different types of sugars. Most pectins are found in fruits but they also consist of about 15-20% of the fiber in nuts, legumes, and vegetables (30).

2.2.5 Resistant Starch

Resistant starches are defined as a starch that is not digested or absorbed in the small intestine (28). Resistant starch is classified into four different types which are summarized in the following table (2.1).

Table2.1. Types of Resistant Starch

Type	**Description**	**Sources**	**Reference**
RS1	Naturally found in food	Seed, cereal grain	**(31,32)**
RS2	Reserve its crystalline after cooking or boiling, resist hydrolysis	Green banana, uncooked potato	**(31)**
RS3	Starch formed by cooking and cooling process	Cooked and cooled starchy food	**(28)**
RS4	Chemically modified by adding chemicals	Adding chemical derivative to starch	**(31)**

2.3. Sources and Types of Dietary Fiber:

Cereal, vegetables, fruits, nuts, and legumes are the major sources of dietary fiber (24). Broadly, dietary fiber is divided into two types: soluble and insoluble. This grouping is based on physical, chemical, and functional properties (33). Soluble fiber easily dissolves in water and forms a gel-like substance. Therefore, it is readily fermented by microflora of the gastrointestinal tract. They consist of psyllium, oat bran, and barley bran. Insoluble fibers do not dissolve in water in the GI tract of the human. Some hemicellulose, cellulose, and lignin are examples of insoluble fiber (28&33).

2.3.1. Fruits and Vegetables Fiber

Fruits and vegetables include a wide variety of plant foods that vary greatly in nutrient and energy content. In addition, fruits and vegetables contain dietary fiber. They also contain dietary minerals and vitamins, as well as phytochemicals, such as polyphenols that serve as phytoestrogens, antioxidants and anti-inflammatory agents, and other protective mechanisms. Common serving sizes of vegetables and fruits have 1-5g of fiber (18).

Fruits and vegetables are useful and high sources of dietary fibre. For example, Tempranillo red grape cultivar has the highest amount of dietary fiber in grapes (5.1 g/100 g fresh weight (FW)) . Apple has a high volume of soluble fiber due to the presence of polymer pectin, which has an appositive health effect as it slows down gastric emptying and reduces

cholesterol (34). The fiber in the cell wall of the ripening fruit becomes more disintegrated, allowing easy access for microbial fermentation, thereby, and enhancing probiotic production (35).

2.3.2. Cereal Fiber

Naturally, cereal and nuts are included as dietary fiber. Wheat, barley, and oat consist of arabinoxylan and glucans as non-starch polysaccharides (36). And, in whole grains, several bioactive components are found, such as oligosaccharides, fiber, phytate, resistant starch, minerals and phytoestrogen (37).

Oat fiber has shown a clear decrease in total plasma and LDL cholesterol (38). Pereira et al. (2004) found that for every 10 g/day increase in fruit and cereal fiber intake, the risk of coronary death was reduced by 35% and 29% respectively (24).

2.3.3. Legumes Fiber

Research has shown that legumes are a good source of dietary fiber. Various studies have found a significant inverse association between the intake of legumes and the risk of CVD. Water-soluble fiber is responsible for cholesterol-lowering effects in legumes (39). Flaxseed (28.0 g/100g dietary fiber) has been reported to have a protective effect on CVD (40).

2.4. The Recommended Intake of Dietary Fiber:

The Institute of Medicine (IOM) set an AI value of 14 g of fiber per 1000 kcal. This value was obtained from the relationship between fiber intake and coronary heart disease (CHD) risk. The IOM fiber recommendation is the highest for populations who consume the most energy, namely young males. However, the recommendations for fiber are lower for older people and women (18). Reference fiber values according to the AOAC range (25-35g) for adults (30).

Table 2.2. Dietary Fiber Recommendation for Children and Adolescents in Some Countries (41).

Country	**Age (year)**	**Recommended fiber intake (per day)**	**Rational recommendation based on**
USA	14-18 3-20	38 g (male), 26 g(female) Age + 5 g	According to safety consideration
Europe	14–18 1-3 4-6	40 g (M), 30 g (F) 10 g 14g	Normal laxation calculated from energy intake

2.5. Health Benefits of Dietary Fiber:

Nowadays, dietary fibers are identified as having many health-promoting effects on certain gastrointestinal diseases, colon cancer, constipation, diabetes, obesity, cardiovascular disease, and hypertension (17).

Obesity in childhood and adolescents has a globally major concern as it represents a global epidemic all over the world. It is a risk factor for many chronic diseases including hypertension, hyperinsulinemia, early atherosclerosis, and hyperlipidemia (42). There are several mechanisms in which dietary fiber may influence obesity. The clearest way between dietary fiber and obesity progression is through its impact on the energy intake control procedure. The hypothesis for interpreting the dietary fiber mechanism is to suppress energy intake by inducing satiety (43). Foods that are rich in fiber need more time and effort to chew, which promotes saturation by reducing the ingestion rate. Soluble fiber also attracts water and forms a gel-like substance, which may increase the distension of the stomach. This is hypothesized to trigger afferent vagal signals of fullness (44).

According to the American Dietetic Association, high fiber diets are more satiating and they lower body weights (21). A number of factors could contribute to the ability of dietary fiber to decrease body weight or to attenuate weight gain. Firstly, when soluble fiber is fermented in a large intestine, it produces peptide YY (PYY) and glucagon-like peptide (GLP-1). These two hormones play a role in inducing satiety. Secondly, dietary fiber reduces the amount of energy consumed (28).

Soluble fiber may have an effect on gastric emptying by forming a gel substance. This slows down the digestion of nutrients and retards their exit from the stomach. Nutrient absorption, therefore, required more time for

diets which are rich in soluble fiber (44). Data, Slavin states that 20 to 27 g/day of whole food or more than 20g of supplements may help in weight regulation (33). Gastrointestinal tract is affected by dietary fiber intake. Some types of fiber bind bile acid lead to an increase in excretion of bile acid and cholesterol with feces, some fiber fermented in the colon and increased bacterial mass with some acting as prebiotics such as bifidobacteria and lactobacilli. Approximately 30 grams of bacteria are produced for each 100g of fermented carbohydrate. Insoluble fibers are particularly effective in increasing fecal bulk and in promoting regularity (17&23). Dietary fiber is a fermentation substrate that produces SCFAs such as acetate, butyrate and propionate as end products. Butyrate is a major source of colonocyte energy. Propionate is taken by the liver, which may reduce the hepatic build-up of cholesterol by interrupting its synthesis (23).

2.6. Chronic Disease and Childhood:

At the beginning of the twentieth century, public health reported a significant shift in the epidemiology of health and disease among newborns, children and adolescents. The burdens of chronic diseases and disabilities among children have increased rapidly due to different types of common diseases (obesity, mental health conditions, neuro-developmental disorder, asthma, type I diabetes and cancer). In the past century, infectious diseases have markedly decreased. This decrease is the result of public health efforts to improve sanitation, nutrition and immunization (45).

Developing countries are undergoing a nutritional shift characterized by an increase in nutrition related to chronic diseases such as obesity, iron prevalence, and zinc deficiency. The causes of obesity and nutrition related to chronic disease are due to dietary changes and lack of physical activity (46).

Cross-sectional studies in Europe have found that young adults, who have different kind of chronic childhood diseases, have a lower level of vocational and educational performance and may also suffer from behavioral problems such as anxiety, social withdrawal and depression (47&48)

2.6.1. Some Chronic Diseases among Children

2.6.1.1. Asthma

It is a long-term inflammatory disease that affects the symptoms of the lungs, including chest tightness, coughing and wheezing. This disease cannot be cured in children; only symptoms can be controlled by the use of anti-inflammatory treatment and steroid (49).

2.6.1.2. Type I Diabetes

Type I Diabetes is the autoimmune destruction of pancreatic B cells. It is usually diagnosed in children and adolescents. Lifestyle changes, enough exercise and diet can control glucose levels without any medication (49).

2.6.1.3. Childhood Obesity

Obesity has a considerable impact on children's health in the future as overweight children remain obese in adulthood. What's more, Obesity increases the risk of chronic diseases such as CVD and type II diabetes. A cross-sectional study was conducted by Al-Lahham et al,(2019) in Palestine, with a total sample size of 1320 school-aged children, concluding that the wide spread of overweight and obesity was 14.5% and 15.7%, respectively. This finding was the same as the prevalence of obesity in some Middle East countries such as Jordan and the United States. A study in (2004) estimated the prevalence of overweight and obesity in Palestinian children. It was nearly 13.3% and 3.2%, respectively. These results indicated a rapid increase in obesity, but not over weight among Palestinian children within a short period of time, and this is dangerous (50).

The common causes of obesity among children and adolescents are due to physical inactivity, food advertising, extreme diet, and long periods of watching television (51).

2.7. Adolescents Nutrition

Adequate nutrition is important for adolescent's growth and for the development of good eating behaviors. Nutritional needs are higher in adolescence compared to other times in the life cycle due to the rapid growth and development at this stage (15). Adolescents' food choices are a complex process that is affected by many factors, such as peer pressure,

parental education, nutritional knowledge, mass media, self-concept, food preferences, and body image (11 &52&53). Adolescents' food habits are important because this stage of the life cycle needs more energy and nutrients compared to adults. Fast food dependence has become a common feature of children's diets throughout the world (54). Several types of research in the Arab world have shown that adolescent eating habits are unhealthful. One of the predominant challenges of eating a healthy diet is the lack of information about healthy nutrition. Syrian adolescents, for example, get daily energy intake from sugary beverages and sweets (16).

2.7.1. Nutrition Requirements

The dramatic growth and development, which are associated with physiological and psychological changes, occurred during adolescence. These alterations increase their nutritional needs. Consuming a healthy diet during childhood is a critical need to ensure a good development during puberty. Total nutritional needs during adolescence are the highest compared to the other stages of the life cycle. During puberty, males and females gain more weight. Whereas males increase in their muscle mass and decrease in their total body fat (55), females have a lower increase in lean body mass but a higher increase in body fat. These changes increase the demand for nutrients (zinc, calcium, iron, and protein) (56).

2.7.1.1. Macronutrient Requirements

The energy recommendation for adolescent males is higher than females due to the greater increase in their lean body mass and it will vary according to their physical activity (57).

Carbohydrate requirements for adolescents can be calculated by subtracting the total recommended caloric intake from the energy of proteins and fats. 55%-60% of the daily energy needs to be recommended to contain carbohydrates (58). Ideal protein requirements for males aged 15-18 years and females aged 11-14 years are high. If the energy requirement is not sufficient, the dietary protein will be used to compensate for this deficiency and will lead to insufficient protein for tissue repair and synthesis of new tissue (57&59).

2.7.1.2. Micronutrient Requirements

The need for iron during adolescence increases in both boys and girls. This occurred due to an increase in lean body mass and blood volume, especially in boys, whereas girls need more iron due to the menstrual cycle. 0.7-0.9 mg/Fe /d for preadolescent iron requirements in females, increasing to 2.2 mg Fe/d in adolescence (60 &61).

Adequate calcium intake is recommended during all stages of life. Calcium reference dietary intake ranges from 500 to 1200 mg/d. Calcium absorption is increased during puberty, so sufficient calcium intake is required to attain peak bone mass, especially for girls aged 18 years to achieve 90% of the peak bone mass (62&63). Folate is the natural form of water-soluble B

vitamin that is naturally found in any type of food such as liver, legumes, egg yolks, and leafy vegetables (broccoli, spinach, lettuce, beans). These examples are the main source of folic acid (64 &65). Folic acid can be synthesized, used as supplements, and added to food as fortification. The recommended dietary allowance (RDA) for 9-13 y is 300 and 400 μg/day for 14-18 y (58). Folic acid deficiency can cause neural tube defects in the embryo (66).

Table2.3. Dietary Reference Intakes (DRIs): Estimated Average Requirements Food and Nutrition Board, Institute of Medicine, National Academies

Life stage group	Protein g\kg\d	CHO (g\d)	Calcium(mg\d)	Iron mg\d	VitD(μg/d)	Folate (μg/d)
Males						
9-13	0.76	100	1100	5.9	10	300
14-18	0.73	100	1100	7.7	10	400
Females						
9-13	0.76	100	1100	5.7	10	250
14-18	0.71	100	1100	7.9	10	330

2.8. Nutritional Problems in Adolescents:

In this age group, nutritional research shows the spread of insufficient dietetic habits, such as high intake of processed or sugary food, long gaps between meals, and low consumption of fruit and vegetables (11). Dietary intake during this period may have long term health consequences. For

example, fat intake during adolescence may increase the risk of coronary heart disease; low dietary calcium intake may lead to low bone density in adolescents, as well as the possibility of osteoporosis later in life. Overweight as an adolescent is associated with being overweight as an adult. Iron deficiency anemia is a common type of anemia. Adolescents are at high risk due to the increasing requirement of iron and poor dietary intake (67). Anemia has a number of adverse health effects. It does not only harm the growth of adolescent girls, but it also affects their school performance, memory, and decreases immune system function. What's more, pregnant adolescents are at risk of low birth weight (68).

2.8.1 Fiber Consumption Among Adolescents

Adolescence, which represents a vital stage in each and every individual's life, is characterized by major physical, biological, emotional and psychological changes. Therefore, adolescents' healthy growth and development are one of the foundations of the world's future (25). Over the past decades, human diets have been changing, including increasing amounts of refined grains, added fats and sugar, meat, low fiber intake, fewer vegetables, and protein (33).

Childhood and adolescence are important periods for obtaining a diet of good nutritional value in order to establish healthy eating behaviors that affect adult mortality and morbidity (52).

Palestinian society has been undergoing nutritional shifts (from traditional to westernized diet). This has led to the widespread of chronic nutritional

diseases such as diabetes and obesity among adult Palestinians. Eating irregular meals was common among adolescents, especially girls. Girls were positively associated with high fat intake and high sugar foods (69).

Adolescence and early adulthood are essential for the development of healthy eating patterns. This is because dietary habits in adolescence remain the same in adulthood. The consumption of fruits and vegetables, therefore, has a significant effect on health (70). Adherence to healthy eating is a multidimensional issue that may be influenced by a number of determinants that can impact adolescent choice such as social, personal, economical, cultural, age, gender, and parental characteristics of the family and social environments of adolescents (71). According to the first Palestinian National Health and Nutrition Survey, the average daily dietary fiber intake in Palestinian residents was 20 grams. Dietary fiber consumption in males was higher than in females in all age groups, due to higher energy intake (daily median dietary fiber intake in males (21.5) g while intake in females was (18) g (72).

The fiber content of fruits and vegetables can be either increased or reduced through processing (18). Starting with reducing, peeling vegetables or fruits decreases the fiber content (73). Generally, cooking at home has a negligible effect on fiber content. Cooking can either increase or decrease the fiber content of the product if the water is taken out of the cooking process. However, baking or thermal treatment used in food processing

increases the fiber content of the product by removing the water so the fiber will be concentrated. Fruit juices are not devoid of fiber.

The researcher has documented a number of studies on the health impact of dietary fiber. In 2004, a land mark study analyzed data from different cohort studies in Europe and the USA to find a correlation between dietary fiber from fruits and cereals and coronary heart disease. The result demonstrated that the fiber intake of about 10 g/day decreased the risk of CHD by 14% (24). Another cohort study of 252 middle-aged women reported an increase in body weight of 0.25 kg for every 1g decrease in total fiber intake over the 20-month period (74).

Many studies have indicated the degree of knowledge, attitudes and the importance of DF and its healthy effects among adolescents. Norlida Daud et al (2018) assess the knowledge, attitudes and practices of dietary fiber intake through a cross-sectional study that was conducted among rural and urban schools in Malaysia. 305 adolescents with an average age of 13.5 years completed the validated KAP questionnaire on dietary fiber intake and 24-hour dietary recall. The results indicated that rural adolescents had more significant positive knowledge and attitude about DF intake and its food sources compared with urban (75).

Marquitta et.al (2013) evaluated fruits and vegetables consumption through 3 governmental primary children schools in Spain. Descriptive study design and self-administered questionnaire were used to assess fruits and vegetables consumption. The questionnaire was completed by 102 students

with a total average age of 11 years. The result showed that children have a positive attitude towards fruits consumption but a negative attitude towards vegetables consumption. This was explained by many reasons such as the bright colors and the sweet taste of fruits which made children preferred fruits. The study found no significant difference observed in boys and girls regarding fruits and vegetables consumption (76).

Raquel et al (2016) examined dietary fiber knowledge and studied factors affecting fiber intakes such as the level of education, gender, living environment, or country. A cross-sectional study was conducted in 10 countries from different continents (America, Africa, and Europe) and the data was collected through a questionnaire answered by 6010 participants with an average age of 34 years ranging from 17-84. The result demonstrated significant gender differences. Men had more information about dietary fiber than women, and the highest level of DF knowledge was found among female participants who live in urban areas with higher education (77)

Chapter Three

Methodology

3.1. General Design:

This study employed a cross-sectional design. It was carried out in governmental secondary schools among healthy male and female students aged 13-16 years old from seventh to tenth grade. Moreover, it was conducted in various regions of the West Bank between October and November of 2019 (Salfit, Nablus, Tulkarm, Jenin, and Hebron). The analysis included all the classes from seventh to tenth grade from the selected schools. All the students were invited to participate in the research in each class. The trained data collection team assisted the students in completing the questionnaires and requesting to answer them accurately. In order to clarify questions if necessary; the research team was present during the administration of the questionnaires. Furthermore, respondents were informed that participation was voluntary and that information would be handled confidentially.

Participants were asked to select the correct answer from multiple-choice questions in the knowledge questionnaire. Dichotomous items were included in the practice questionnaire in which the responses were “yes, or no”. The answers were "agree", "disagree", and "no opinion" for the attitude questionnaire.

The pilot study was conducted to identify the possibility of problems with the revision of data collection methods before the beginning of the actual testing, which was as follows:-

1. Decide if the developed, validated tool is reliable.
2. Testing the questionnaire to find out whether the questions are understood and easily answered.
3. Assess whether a logical, clear, and accurate translation is applied in the sequence of the questions.

The pilot study included 30 students from the tenth and eleventh grades in two schools (Yasouf Iskak boys' secondary school and Broqin girls' secondary school). Then the reliability test was done for the items using the Cronbach alpha test.

Data Collection

The data was collected using a newly developed validated questionnaire. This questionnaire consisted of four sections. First, section one aimed for identifying characteristic and demographic information about the participants which was composed of (1) birth date, grade, (2) residence, (3) type of family, (4) number of brothers and sisters living at home, (5) number of the family members, (6) mother's occupation, (7) father's occupation, (8) father's educational level, (9) mother's educational level, and (10) family income. Second, section two meant to identify participant's medical history which was composed of (1) presence of chronic illness, (2)

previous surgical procedures, (3) permanent treatment, (4) smoking, (5) amount of sleeping hours, (6) time of sleep, (7) time of waking up, (8) going to school on foot or by transport, (9) playing sports, and (10) amount of hours of watching TV or using smart phones. Third, section consisted of questions about dietary habits, the answers to each item were divided into 5 categories which are always, usually, sometimes, rarely, and never. Finally, section four included the newly developed knowledge, attitude, and practices items related to dietary fiber.

3.2. Ethical Considerations:

The study protocol was approved by the Internal Review Board for Research Ethics at An-Najah University. A formal letter was sent to the Palestinian Ministry of Education from the Faculty of Higher Education at An-Najah University. Approval was also obtained from the Directorate of Education in the selected regions.

3.3. Subjects Characteristics:

The study population included all students from seventh to tenth grades from secondary schools of the West Bank. These students were selected by simple random sampling from governmental secondary schools.

3.4. Inclusion and Exclusion Criteria:

3.4.1. Inclusion Criteria

All students from the seventh, eighth, ninth, and tenth grades from the 21 selected schools in Nablus, Tulkarm, Salfeet, Jenin, and Hebron regions.

3.4.2. Exclusion Criteria

Students who have recently made surgical operations that may affect their dietary habits as well as students who did not agree on doing the anthropometric measurements.

3.5. Sampling Method

The sample size has been determined using G power software. An alpha level of (0.05) was considered, two-sided p values of (0.05), and (80%) power were also considered. The required sample size was 400 students, with 5% dropout and missing data. The sample size is considered to be 450 participants of each gender.

3.6. Nutritional Status Assessment and Lifestyle:

3.6.1. Nutritional Status Assessment

Nutritional status in this study had been done by anthropometric measurements and dietary habits.

3.6.2. Anthropometric Measurements

The key anthropometric parameters used were weight and height. The calculation was performed following the standard anthropometric techniques (78). Before the measurement, all equipment had been calibrated. Anthropometric measurements were performed by wearing light clothing without shoes. The measurements were replicated twice to obtain an average reading. Height measurement was done using a portable stadiometer. Each subject was asked to take off any footwear, and then

asked to stand up with the back against the scale, legs straightened, and arms lying at both sides, shoulders relaxed and looking straight ahead to achieve the correct position. The two readings were recorded to the nearest 0.1 cm (78). The body weight was measured at the nearest 0.1 kg using a digital scale. Each subject was asked to set aside all the belongings (wallets, watches, shoes, cell phones, keys, belts, etc) that might contribute to weight, and then stand up with the feet above the center of the platform; the readings were allowed to stabilize and the weight was recorded. The body mass index (body in kilogram divided by height squared in meter (kg/m^2) was measured.

Classification of BMI into underweight, normal weight, overweight and obese, was done using WHO cut off points as shown in Tables 3.1 and 3.2.

Table 3.1. BMI-for-Age, boys 5–18 Years (WHO 2007)

Age(years, month)	Severe malnutrition	Moderate malnutrition	Normal	Over weight	Obese
12	Less than 13.4	13.4-14.4	14.5-19.9	20-23.6	23.7 or higher
12.6	Less than 13.6	13.6-14.6	14.7-20.4	20.5-24.2	24.3 or higher
13	Less than 13.8	13.8-14.8	14.9-20.8	20.9-24.8	24.9 or higher
13.6	Less than 13.8	13.8-15.1	15.2-21.3	21.4-25.3	25.4 or higher
14:0	less than 14	14-15.1	15.2-21.3	21.4-25.3	26.0 or higher

14:6	less than 14.5	14.5-15.6	15.7-22.2	22.3-26.5	26.6 or higher
0: 15	less than 14.7	14.7-15.9	16.0-22.7	22.8-27	27.1 or higher
15:6	less than14.9	14.9-16.2	16.3-23.1	23.2-27.4	27.5 or higher

Table 3.2. BMI-for-Age girls 5–18 Years (WHO 2007)

Age	Severe malnutrition	Moderate malnutrition	Normal	overweight	Obese
12	Less than 13.2	13.2-14.3	14.4-20.8	20.9-25	25.1 or higher
12:6	Less than 13.4	13.4-14.6	14.7-21.3	21.4-25.6	25.7 or higher
13	Less than 13.6	13.6–14.8	14.9-21.8	21.9-26.2	26.3 or higher
13:6	Less than 13.8	13.8-15.1	15.2-22.3	22.4-26.8	26.9 or higher
14	Less than 14	14.0–15.3	15.4-22.7	22.8-27.3	27.4 or higher
14:6	Less than 14.2	14.2-15.6	15.7-23.1	23.2-27.8	27.9 or higher
15	Less than 14.4	13.2-14.3	15.9-23.5	23.6-28.2	28.3 or higher
15:6	Less than 14.5	13.2-14.3	16-23.8	23.9-28.6	28.7 or higher

3.6.3. Dietary Intake Assessment

Students' dietary habits were assessed using 14 items. A Likert scale has been used for each item, ranging from (never, rarely, sometimes, most of the time, always). These items are: (1) taking meals at fixed times, (2) eating whole fresh fruit or drinking juice daily, (3) eating fresh or cooked vegetables, (4) eating whole bread, (5) eating processed meat, (6) eating fast food, (7) eating dairy product daily, (8) drinking enough water more than 10 cups, (9) eating nuts at least twice a week, (10) eating fish twice a week, (11) eating 3 basic meals daily, (12) drinking sweet juice daily, (13) eating breakfast daily, and (14) eating sweets daily.

3.7. Questionnaire Development:

Several studies have been conducted to determine the knowledge, attitudes, and practices regarding dietary fiber among different age groups. Basic concepts and information on dietary fiber have been formulated as queries, please refer to Appendix 1.

The knowledge questionnaire consisted of multiple-choice questions in which participants had to select the correct answer, please refer to the next section. The practice questionnaire consisted of ten items in which the responses were yes, no, or sometimes. Please see the next section. Attitude questionnaire items had 3 levels of Likert scale items, see section 3.7.1.

Content Validity of The Questionnaire was Tested as Follows:

The questionnaire was developed by the researcher, based on a review of relevant literature in order to achieve the objectives of the study. The quality of the original 40 KAP questionnaire items was evaluated by sending them to 8 nutritionists, five are nutrition experts and three are experts in the assessment. Based on their reviews, three components have been rephrased for clarification

A pre-test was conducted as a pilot study among 30 students to determine the reliability of the items. The reliability test was done using Cronbach's alpha. The reliability test for the attitude questions was 0.65 and for the practice questions was 0.72 .

3.7.1. Knowledge Questionnaire

Sixteen items have been developed as multiple choice questions. These questions are: (1) type of food that must be eaten to increase dietary fiber intake, (2) the recommended amount of dietary fiber for males and females, (3) the amount of dietary fiber in white bread and whole bread, (4) the amount of dietary fiber in fruit and its juice, (5) food that is considered to be rich in dietary fiber, (6) sentence is true regarding to digestion of dietary fiber, (7) amount of serving sizes of fruits and vegetables that is recommended according to the diet pyramid, (8) beneficial health effects of dietary fiber, (9) differences between unpeeled grain and peeled grain in terms of dietary fiber content, (10) the effects of dietary fiber in meals, (11) the main types of fiber, (12) diseases that are recommended to increase

fiber consumption, (13) where fiber changed to calorie, (14) the effects of dietary fiber on intestine, (15) sources of dietary fiber, (16) peeling fruits and vegetables affect the amount of fiber in it. There are three choices for answering, one choice is valid.

3.7.2. Practice Questionnaire

Practices have been measured by the following items: (1) eating fresh or cooked vegetables with each meal, (2) eating fruits daily, (3) eating salad continuously with each meal, (4) putting the vegetables aside from a meal rather than eating it, (5) eating whole bread more than white bread, (6) eating processed meat with snack more than eating hummus and falafel, (7) eating chips and chocolate and prefer it more than nuts and lupine, (8) drink juice more than cocktail, (9) eating grains such as burghul and freekeh instead of rice and white bread, and (10) eating vegetables with fast food to increase fiber intake. The answers for each item were recorded as yes, sometimes, and no.

3.7.3. Attitude Questionnaire

Attitudes were measured by analyzing the following items: (1) eating fruits and vegetables promotes good health, (2) eating fast food with low vegetables induces weight gain, (3) eating whole grain (freekeh, burghul, wheat) causes dyspepsia, (4) reducing intake of fruit and vegetables raises the risk of chronic illness, (5) eating foods high in fiber causes increased satiety and fullness, (6) TV and mass media which propagate for certain food products contribute to the increase in food rich in dietary fiber, (7) it is

difficult to increase the amount of dietary fiber, (8) it is not harmful to eat fiber, (9) the increase in the daily consumption of fruits and vegetables causes digestive disorders, (10) the rise in the consumption of legumes harms the digestive system, (11) food high in dietary fiber has an unacceptable taste, (12) a darker color of bread means more fiber, (13) it is better to consume dietary fiber as supplements, and (14) peeling fruits reduces the amount of fiber in it. The answers for each item have been reported as agree, disagree, and no opinion.

3.8. Statistical Analysis:

All statistical analyzes were performed using the software Statistical Package for Social Sciences (SPSS) version 21.0. For all the statistical tests used in the analysis, an alpha level of (0.05) was considered. Two-sided p values of (0.05) and (80%) power were considered statistically significant. Before the study began, the data was cleared from the missing data for the primary outcome variables, i.e. knowledge, attitude, and practice in addition to gender, body weight, body height, and age, since all of these variables are primary outcome variables. Any datasheet that contained missing data from any of the variables listed above by the participants was excluded. Afterward, non-valid data was cleared from any unreasonable readings in height, weight, or age. Only 1 extreme value was removed from the BMI ($49 kg/m^2$) which is when the outliers were tested.

The data was analyzed according to phases. Each phase had a separate analysis. The normality test was checked for all the continuous variables

using the Shapiro-Wilk Test Descriptive analysis including the means and the standard deviations used to evaluate data relating to continuous dependent and independent variables. The categorical data were described by percentages. The Independent samples t-test and ANOVA test were conducted to examine the variations in the overall nutritional knowledge score due to selected independent variables at alpha <0.05. A Chi-square test was used to determine the association of the categorical variables.

Chapter Four

Results

984 participants were invited and agreed to join this study. However, 166 participants were excluded due to missing data. Therefore, 818 participants were included in the final analysis. Table (1) shows the socio-demographic characteristics of the study population which is presented in frequencies and percentages. On the one hand, the majority of participants were females, *n* =435 participants which forms (53.2%) of the study population. On the other hand, males were *n*=383 which forms (46.8%) of the study population. Schools were chosen from different regions. The distribution of schools was as follows: 186 schools from Nablus (22.7%), 200 from Tulkarem (24.4%), 116 from Jenin (14.2%), 156 from Hebron (19.1%), 160 from Salfit (19.6%). 511 schools were located in cities (62.5 %), while 307 are in villages (37.5%). Furthermore, there were two types of schools. Firstly, there were 644 secondary schools (78.7%). Secondly, there were 174 basic schools (21.3%).

Table4. 1. School Characteristics Presented in Numbers and Percentages

Demographic characteristics		**Number *N***	**Percentage (%)**
Gender	Male	383	46.8
	Female	435	53.2
District	Nablus	186	22.7
	Tulkarem	200	24.4
	Jenin	116	14.2
	Hebron	156	19.1
Location of school	Salfeet	160	19.6
	City	511	62.5
	Village	307	37.5
School-level	Basic	174	21.3
	Secondary	644	78.7

4.1. Students Socio-Demographic Characteristics:

The mean age of the participants was 14.26 years, varying from 12 to 15 years. 15 students were in the seventh grade (1.8%), 160 in the eighth grade (19.6%), 376 in the ninth grade (46%) and 267 in the tenth grade (32.6 %). In addition, 503 participants live in cities (60.4%), while 49 participants live in villages (36.6%) and the remainder live in camps. 749 (91.6%) are nuclear families, 69 (8.4%) are extended.

The parents' educational level varied. Firstly, the primary education level was (16.9%) for fathers and (14.5%) for mothers. Secondly, secondary education forms the highest percentage, in which fathers had the percentage of (39.6%), while mothers ranged (44.7%), respectively. Thirdly, the rate of fathers' who had a diploma or bachelor's degree was (27.5%), and (30.1%) for mothers. Finally, master education ranged (0.6 %) for fathers and (0.2%) for mothers.

The percentage of employed fathers was (95.2%) and (25.8%) for mothers. However, for unemployed fathers, the percentage was (4.9%), and (74.2%) for unemployed mothers. The family monthly income varied among the students. 245 of students' families had a monthly income of between 1500 and 3000₪ (30.4%). 181 families had 5000₪ monthly income (22.5%). 178 families had 3000-5000₪ monthly income (22.1%). Finally, 89 families had less than 1500₪ monthly income (11.1%).

Table 4.2. Students Socio-Demographic Characteristics Presented in Numbers and Percentages

Demographic characteristics		**Number** ***N***	**Percentage (%)**
Student age	12 years	15	1.8
	13 years	160	19.6
	14 years	340	41.6
	15 years	303	37
Class level	Seventh grade	15	1.8
	Eighth grade	160	19.6
	Ninth grade	376	46
	Tenth grade	267	32.6
Address	City	475	58.1
	Village	332	40.6
	Camp	11	1.3

Family type	Nuclear	749	91.6
	Extended	69	8.4
Fathers' education level	Not educated	68	8.3
	Primary education	138	16.9
	Secondary education	324	39.6
	Diploma or Bachelor	225	27.5
	Master	5	0.6
	Others	58	7.1
Mothers' education level	Not educated	52	6.4
	Primary education	119	14.5
	Secondary education	366	44.7
	Diploma or Bachelor	24	30.1
	Others	2	0.2
	Master	33	4

Fathers' occupation	No work	40	4.9
	Governmental	211	25.8
	Professional work	290	35.5
	Free business	277	33.9
Mothers' occupation	No work	607	74.2
	Governmental	128	15.6
	Professional work	21	2.6
	Free business	62	7.6
Average family income	Less than 1500 NIS	91	11.1
	1500-less than 3000 NIS	249	30.4
	3000- less than 5000 NIS	181	22.1
	More than 5000 NIS	184	22.5

4.2. Medical History, Smoking Status, and Lifestyle:

Medical history, smoking status, and students lifestyles according to gender are presented in table (3). Regarding the medical history, 99.2% of males, and 98.9% of females have no chronic illness, respectively. 99.0% of males and 98.9% of females do not take medicine. 88%, 87.6% of males and females did not experience any surgical operations. Regarding the smoking status, 19.8% of males, and 14.9% of females are smokers. On the one hand, 35.5% of males are regular smokers. On the other hand, 64.5% of males are irregular smokers. While 24.6% of females are regular smokers, 75.4% of females are irregular smokers, respectively. Most males smoke shisha 51.3%, while the remaining smoke cigarettes 34.2%, and only 2.9% used both of them. However, shisha is more common among females; about 76.9% smoke it. Whereas 20% of females smoke cigarettes, and 3.1% smoke both. Regarding the lifestyle, 71% of males go to school on foot, 28.5% by transport, and 0.5 % use both. Nevertheless, 67.4% of females go to school on foot, 31.5% by transport, and 1.1% use both. Moreover, most males and females practice sports irregularly 54.6%, 55.9%, respectively. In contrast, 25.3% of males and 23.9% of females practice sports regularly. Finally, 20.1% of males and 20.2% of females do not practice sports.

Table 4.3. Medical history, Smoking Status, and Lifestyle according to Student Gender

		Total		**Male**		**Female**	
		N	%	*N*	%	*N*	%
Chronic diseases	Yes	8	1	3	99.2	5	1.1
	No	810	99	380	0.8	430	98.9
Taking drugs always	Yes	809	98.9	4	1	5	1.1
	No	9	1.1	379	99	5	98.9
Surgical operation	Yes	718	87.8	46	12	54	12.4
	No	100	12.2	337	88	381	87.6
Smoking	Yes	141	17.2	76	19.8	65	14.9
	No	677	82.8	307	80.2	435	85.1
Smoking	Regular smoker	N	%	n	%	n	%
		43	5.3	27	35.5	16	24.6

	irregular smoker	98	12	49	64.5	49	75.4
	Missing	677	82.8	307	80.2	370	85.1
Type of smoking	Shisha	89	63.1	39	51.3	50	76.9
	Cigarette	39	27.7	26	34.2	13	20
	Both	13	9.2	11	14.5	2	3.1
	Missing	677	82.8	307	80.2	370	85.1
Family smoker	Yes	526	64.3	230	60.1	296	68
	No	292	35.7	153	39.9	139	32
Going to school	Walking	565	69.1	272	71	293	67.4
	Car	246	30.1	109	28.5	137	31.5
	Both	7	.9	2	0.5	5	1.1
Playing sport	Yes, regularly	201	24.6	97	25.3	104	23.9
	Yes, irregularly	452	55.3	209	54.6	243	55.9
	No	165	20.2	77	20.1	88	20.2

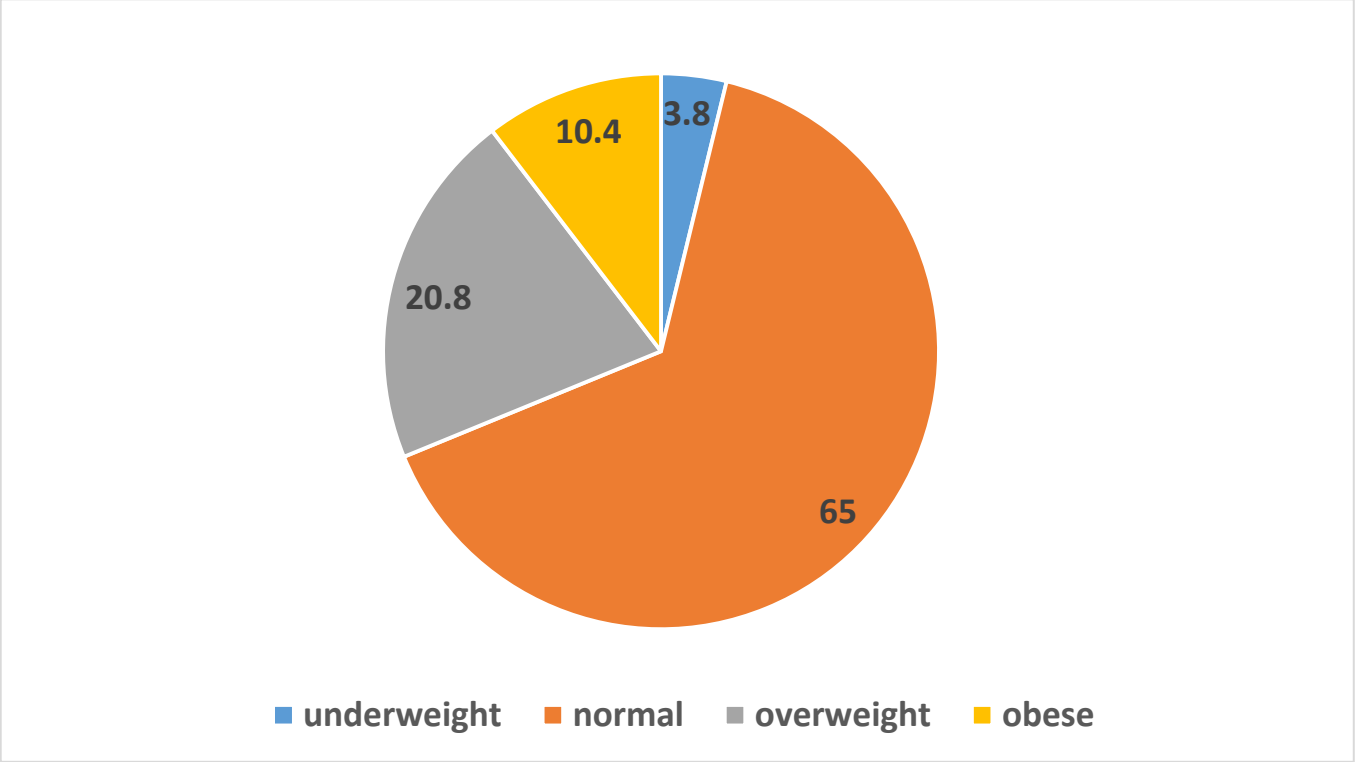

Figure (1): Distribution of students according to their BMI

4.3. Dietary Habits:

The Dietary habits of the participants are presented in Table (4). There was a crucial relationship between dietary habits and gender regarding eating meals at a regular time. Most females tended to consume meals at a regular time p=0.02 compared to males. Also, there was a significant relationship between eating processed meat and gender; males tended to eat processed meat p=0.00 more than females. Moreover, there was a significant relationship between drinking enough water with more than 10 cups and gender. Females tended to drink enough water p=0.00, which is measured with more than 10 cups, compared to males. There was also a cogent relationship between eating breakfast daily and gender; males tended to eat breakfast p=0.05 more than females.

Table 4.4. The Relation between Dietary Habits and Gender

		Total		**Male**		**Female**		**P-value**
		N	%	*N*	%	*N*	%	
Taking meals at regular time	Always	195	24	97	26	98	23	0.02*
	Most of the times	280	35	149	40	131	31	
	Sometimes	185	23	74	20	111	26	
	Few times	77	10	28	7	49	12	
	Never	66	8	29	8	37	9	
Eating whole fresh fruit or drinking juice daily	Always	218	27	98	26	120	28	0.68
	Most of the times	216	27	108	28	108	25	
	Sometimes	253	31	112	30	141	33	
	Few times	100	12	50	13	50	12	
	Never	27	3	12	3	15	4	

Eating fresh or cooked vegetables	Always	218	27	98	26	120	28	0.38
	Most of the times	212	26	102	27	110	26	
	Sometimes	194	24	98	26	96	22	
	Few times	120	15	56	15	64	15	
	Never	63	8	23	6	40	9	
Eating whole bread	Always	73	9	34	9	39	9	0.34
	Most of the times	73	9	37	10	36	8	
	Sometimes	116	14	47	12	69	16	
	Few times	157	19	68	18	89	21	
	Never	395	49	197	51	198	46	
Eating processed meat	Always	147	18	88	23	59	14	0.00**
	Most of the times	176	22	74	20	102	24	
	Sometimes	187	23	94	25	93	22	
	Few times	142	18	62	16	80	19	

	Never	152	19	60	16	92	22	
Eating fast food	Always	175	22	86	23	89	21	0.45
	Most of the times	207	26	91	24	116	27	
	Sometimes	243	30	118	31	125	29	
	Few times	136	17	57	15	79	18	
	Never	50	6	27	7	23	5	
Drinking milk daily	Always	224	28	119	32	105	25	0.11
	Most of the times	177	22	87	23	90	21	
	Sometimes	156	20	70	19	86	20	
	Few times	129	16	57	15	72	17	
	Never	116	15	45	12	71	17	
Drinking enough water more than 10 cups	Always	376	46	188	50	188	44	0.00**
	Most of the times	162	20	90	24	72	17	
	Sometimes	141	17	55	15	86	20	

	Few times	87	11	31	8	56	13	
	Never	44	5	15	4	29	7	
Eating nuts twice a week at least	Always	284	35	124	33	160	37	0.36
	Most of the times	172	21	78	21	94	22	
	Sometimes	169	21	83	22	86	20	
	Few times	138	17	74	20	64	15	
	Never	43	5	19	5	24	6	
Eating fish regularly twice a week	Always	81	10	40	11	41	10	0.34
	Most of the times	122	15	54	14	68	16	
	Sometimes	173	21	92	24	81	19	
	Few times	224	28	100	27	124	29	
	Never	208	26	91	24	117	27	
Eating 3 basic meals daily	Always	380	47	191	51	189	44	0.45
	Most of the times	159	20	71	19	88	21	

	Sometimes	127	16	53	14	74	17	
	Few times	88	11	39	10	49	12	
	Never	50	6	23	6	27	6	
Drinking sweet juice daily	Always	233	29	112	30	121	28	0.60
	Most of the times	210	26	96	25	114	27	
	Sometimes	202	25	96	25	106	25	
	Few times	108	13	45	12	63	15	
	Never	57	7	31	8	26	6	
Eating breakfast daily	Always	372	46	189	50	183	43	0.05*
	Most of the times	133	16	64	17	69	16	
	Sometimes	114	14	54	14	60	14	
	Rarely	115	14	47	12	68	16	
	Never	77	10	26	7	51	12	

Eating sweet daily	Always	272	37	128	36	144	37	0.79
	Most of the times	180	24	79	22	101	26	
	Sometimes	176	24	88	25	88	23	
	Few times	84	11	42	12	42	11	
	Never	32	4	16	5	16	4	

Significant at the level of α=0.01**

Significant at the level of α=0.05 *

Chi- square test used

4.4. Frequencies and Percentages of Correct Answers of Dietary Knowledge Questions:

Overall, the participants showed inadequate knowledge about dietary fiber intake. Table (5) demonstrates the majority of participants who did not answer the basic knowledge questions correctly. For example, 73% knew the correct answer for Question 1, “Which of the following foods can be eaten to increase dietary fiber intake". Moreover, 60.9% answered Question 3 correctly which was: "What is the amount of dietary fiber in white bread and whole bread" , and 54.8 % gave the correct answer for Question 5; “Which of the following foods is rich in fiber". Furthermore, 53.8% gave the correct answer for Question 9," What are the differences between unpeeled grain and peeled grain in terms of dietary fiber content". Finally, 57.7% gave the correct answer for Question 16 “peeling fruits and vegetables affects the amount of fiber in it".

However, the participants were not able to give the correct answers to other specific questions. For example, 60% wrongly answered Question 2, “What is the recommended amount of dietary fiber intake for males and females”. 54.8 % wrongly answered Question 4 “What is the amount of dietary fiber in fruit and its juice". What’s more, 60% wrongly answered Question 6 "Which of the following statements is true regarding dietary fiber digestion ". 91.6% wrongly answered Question 7" What is the amount of serving size of fruit and vegetables that is recommended according to the diet pyramid". 50.1% wrongly answered Question 8 "What

are the beneficial health effects of dietary fiber". 76.7% wrongly answered Question 11 "What are the main types of dietary fiber". Furthermore, 68% answered Question 12 incorrectly “What are the diseases that recommend increasing fiber consumption". 55.7% gave false answers for Question 13 “When does fiber change to calorie". 75.3% wrongly answered Question 14 "What are the effects of dietary fiber on intestine". Finally, 63% gave wrong answers to Question 15 “What are the sources of dietary fiber".

Table 4.5. Frequencies and Percentages of Correct Answers

Knowledge items	T		F	
	N	(%)	*N*	(%)
1- Which of the following food can be eaten to increase dietary fiber intake	597	73	221	27
2- The recommended amount of dietary fiber intake for males and females	327	40	491	60
3- The amount of dietary fiber in white bread and whole bread	498	60.9	320	39.1
4- The amount of dietary fiber in fruit and its juice	370	45.2	448	54.8
5- which of the following food rich in fiber	448	54.8	370	45.2
6- Which of the following statement is true regarding dietary fiber digestion	327	40	491	60
7- Number of serving size of fruit and vegetables that is recommended according to diet pyramid	69	8.4	749	91.6
8-Beneficial health effects of dietary fiber	408	49.9	410	50.1

9- Differences between unpeeled grain and peeled grain in terms of the dietary fiber content	440	53.8	378	46.2
10- The effects of dietary fiber in meals	440	53.8	378	46.2
11- The main types of dietary fiber	191	23.3	627	76.7
12- Diseases that are recommended to increase fiber consumption	262	32	556	68
13- Where fiber changed to calorie	362	44.3	456	55.7
14- The effects of dietary fiber on the intestine	202	24.7	616	75.3
15- Sources of dietary fiber	303	37	515	63
16- Peeling fruits and vegetables affect the amount of fiber in it	472	57.7	346	42.3

4.5. Fiber Intake Knowledge and Demographic Variables:

The study found significant differences in the level of knowledge among males and females p=0.007. Females had a higher level of knowledge (7.26±2.35) compared to males (6.79±2.54). Moreover, there were significant differences according to monthly income between student's families p=0.031. Students whose monthly family income was between 3000₪ to 5000₪, had more knowledge 7.53±2.17 compared to families whose monthly income is less than 1500₪ (6.65±2.65). Furthermore, there were significant differences regarding the father's educational level and knowledge p=0.00. For instance, students' fathers who had a diploma or bachelor's degree certificate had the highest knowledge about dietary fiber (7.49±2.46). However, students' whose fathers are not educated had the least knowledge (5.94±2.75). Other factors did not significantly affect the knowledge of dietary fiber (refer to table 4.6).

Table 4.6. The Relationship between Fibers Intake Knowledge and Demographic Variables

Variables	Level	*N*	Mean ± SD	P-value
Gender	Male	375	6.79±2.54	0.007**
	Female	427	7.26±2.35	
Monthly income	Less than 1500 NIS	89	6.65±2.65	0.031*
	1500-3000 NIS	245	7.12±2.25	
	3000-5000 NIS	178	7.53±2.17	
	5000 NIS and more	181	7.07±2.46	
Living area	City	503	7.11±2.38	0.30
	Village	299	6.93±2.56	
Fathers' education level	Not educated	65	5.94±2.75	0.00**
	Primary education	135	7.01±2.40	
	Secondary education	318	7.04±2.29	
	Diploma	223	7.49±2.46	

	Or Bachelor			
	Others	56	6.66±2.64	
	Master	5	6.8±3.11	
Mothers' education level	Not educated	51	6.27±3.01	0.11
	Primary education	116	6.97±2.54	
	Secondary education	359	7.11±2.30	
	Diploma or Bachelor	243	7.23±2.43	
	Others	31	6.39±2.80	
	Master	2	7±0.005	

**Significant at the level of α=0.01

Significant at the level of α=0.05 *

Independent and One-Way Anova tests used

4.6. The Relationship Between Practice Regarding Dietary Fiber Intake and Gender:

The association between dietary fiber intake practices and gender is presented in table (4.7). There is a significant relationship p=0.04 between eating chips and chocolate and preferring them more than nuts and lupine which was shown in these practices. Females agree with these practices more than males.

Table 4.7. Practice regarding Dietary Fiber Intake According to Gender Presented in n (%)

		Total		**Male**		**Female**		**P value**
		N	%	*N*	%	*N*	%	
Eating fresh or cooked vegetables with each meal	Yes	251	20.2	113	29.8	138	31.8	0.23
	Sometimes	398	49	197	52	201	46.2	
	No	164	30.9	69	18.2	95	21.8	
	Missing	5						
Eating fruit daily	Yes	338	41.5	155	40.5	183	42.4	0.83
	Sometimes	327	40.1	155	40.5	172	39.8	
	No	150	18.4	73	19.1	77	17.8	
	Missing	3						
Eating salad continuously with each Meals	Yes	296	36.5	129	19.3	167	38.7	0.40
	Sometimes	361	44.6	176	46.6	185	42.8	
	No	153	18.9	73	34.1	80	18.5	
	Missing	8						
Separating vegetables from the meal and don't eating it	Yes	122	15.4	50	13.5	72	17	0.24
	Sometimes	262	33	119	32.1	143	33.8	

	No	410	51.4	202	54.4	208	49.2	
	Missing	24						
Eating whole bread more than white bread	Yes	96	11.9	49	13	47	11	0.64
	Sometimes	210	26.1	95	25.1	115	26.9	
	No	499	62	234	61.9	265	62.1	
	Missing	13						
Eating processed meat (Sausage) with snack more than eating hummus and falafel	Yes	240	29.7	112	29.6	128	29.8	0.25
	Sometimes	227	28.1	116	30.7	111	25.8	
	No	341	42.2	150	39.7	191	44.4	
	Missing	10						
Eating chips and chocolate and prefer it more than nuts and lupine	Yes	443	54.2	189	50.1	254	59.1	0.04*
	Sometimes	194	24	100	26.5	94	21.9	
	No	170	21.1	88	23.3	82	19.1	
	Missing	11						
Drinking juice more than cocktail	Yes	344	42.5	168	44.3	176	40.8	0.46
	Sometimes	223	27.5	105	27.7	118	27.4	

	No	243	30	106	28	137	31.8	
	Missing	8						
Eating grains such as burghul and freekeh instead of rice and white bread	Yes	214	26.6	102	39.8	112	26.2	
	Sometimes	260	32.3	126	33.2	134	31.4	0.75
	No	332	41.2	151	26.9	181	42.4	
	Missing	12						
Eating vegetables with fast food to increase fibers intake	Yes	220	27.5	107	28.2	113	26.8	0.195
	Sometimes	171	21.3	90	23.7	81	19.2	
	No	410	51.2	183	48.2	227	53.9	
	Missing	17						

Significant at the level of $\alpha=0.05$ *

Chi-square test used

4.7. Attitudes Regarding Dietary Fiber Intake According to Gender:

The association between dietary fiber intake attitudes and gender is presented in table (4.8). Most females agreed that p=0.049 eating fast food and low vegetables would contribute to a rise in weight. There is also an important relationship p=0.042 between darker color of bread and containing more fibers. Thus, females have a more positive attitude than males.

Table 4.8. Attitudes regarding dietary fibers intake according to gender presented in n (%)

		Total		Male		Female		P-value
		N	%	*N*	%	*N*	%	
Eating fruit and vegetables give good health	Agree	707	86.70%	324	84.60%	383	88.70%	0.19
	Disagree	50	6.10%	29	7.60%	21	4.90%	
	No opinion	58	7.10%	30	7.80%	28	6.50%	
Eating fast food with low vegetables cause an increase in weight	Agree	511	63.00%	230	60.70%	281	65.00%	
	Disagree	139	17.10%	60	15.80%	79	18.30%	0.049*
	No opinion	161	19.90%	89	23.50%	72	16.70%	
Eating consistent grain (freekeh, burghul, wheat cause dyspepsia)	Agree	167	20.70%	86	22.60%	81	19.00%	0.089
	Disagree	289	35.80%	144	37.90%	145	34.00%	
	No opinion	351	43.50%	150	39.50%	201	47.10%	

Decrease eating fruit and vegetables increased the probability of chronic disease	Agree	431	54.10%	196	52.40%	235	55.60%	0.673
	Disagree	175	22.00%	85	22.70%	90	21.30%	
	No opinion	191	24.00%	93	24.90%	98	23.20%	
Eating food rich in fibers causes an increase in satiety and cause feeling in the fullness	Agree	458	57.20%	208	55.30%	250	59.00%	
	Disagree	127	15.90%	62	16.50%	65	15.30%	0.58
	No opinion	215	26.90%	106	28.20%	109	25.70%	
TV and mass media which propagate for certain food products contribute to increase food rich in dietary fibers	Agree	266	33.30%	123	32.90%	143	33.60%	0.115
	Disagree	211	26.40%	111	29.70%	100	23.50%	
	No opinion	322	40.30%	140	37.40%	182	42.80%	
It is difficult to eat the recommended amount of	Agree	367	46.00%	177	46.70%	190	45.30%	0.761
	Disagree	200	25.10%	97	25.60%	103	24.60%	

dietary fibers daily	No opinion	231	28.90%	105	27.70%	126	30.10%	
The concern in eating fibers isn’t harmful	Agree	230	28.70%	107	28.40%	123	28.90%	0.744
	Disagree	354	44.10%	169	44.90%	185	43.50%	
	No opinion	218	27.20%	101	26.80%	117	27.50%	
Increase eating fruit and vegetables daily cause digestive disorder	Agree	194	24.20%	90	23.90%	104	24.60%	0.939
	Disagree	356	44.50%	167	44.30%	189	44.70%	
	No opinion	250	31.20%	120	31.80%	130	30.70%	
Increase eating legumes cause a negative effect on the digestive system especially in healthy people	Agree	333	41.80%	150	40.20%	183	43.30%	0.685
	Disagree	216	27.10%	104	27.90%	112	26.50%	
	No opinion	247	31.00%	119	31.90%	128	30.30%	
Food rich in dietary fiber have an unacceptable taste	Agree	200	24.90%	98	25.90%	102	24.00%	0.228
	Disagree	330	41.10%	163	43.10%	167	39.30%	
	No opinion	273	34.00%	117	31.00%	156	36.70%	

The darker color of bread means containing more fibers	Agree	300	37.40%	125	33.10%	175	41.20%	0.042*
	Disagree	194	24.20%	93	24.60%	101	23.80%	
	No opinion	309	38.50%	160	42.30%	149	35.10%	
It is better to consume dietary fibers as supplements	Agree	381	47.30%	194	51.20%	187	43.80%	0.064
	Disagree	174	21.60%	81	21.40%	93	21.80%	
	No opinion	251	31.10%	104	27.40%	147	34.40%	
Peeling fruits decrease the amount of fiber.	Agree	496	60.90%	228	59.50%	268	62.00%	0.176
	Disagree	137	16.80%	59	15.40%	78	18.10%	
	No opinion	182	22.30%	96	25.10%	86	19.90%	

Significant at the level of $\alpha=0.05$ *

Chi-square test used

4.8. The Relationship Between Fiber-Related Knowledge, Practices, and Attitude:

There were no significant relationships between the overall score of knowledge and dietary practices which were discovered by using the Nova test. However, item 4 had a significant relationship which is “separating vegetables from a meal rather than consuming it”, p=.036. Most students do not separate the vegetables from the main meal which is considered as a good practice and the mean value was 7.42± 2.43. Furthermore, item 6 had a significant relationship p= 0.01. “eating processed meat (Sausage) with a snack more than eating hummus and falafel", p= 0.01, however, most students didn’t eat processed meat with a mean value 7.27±2.46. Item 8 "drink juice more than cocktail" had a significant relationship p=0.037. Most students didn’t drink juice more than cocktails with a mean value 7.36± 2.49. To conclude, there was a significant relationship for most items of attitude and knowledge. Refer to table 4.9.

Table 4.9. The Relationship between Fiber-Related Knowledge and Attitude

Question	Level	Mean ± SD	P-value
Eating fruits and vegetables give good health	Disagree	6.53± 2.59	0.05*
	No opinion	6.47± 2.44	
	Agree	7.12±2.44	
Eating fast food with low vegetables cause an increase in weight	Disagree	6.74± 2.39	0.000
	No opinion	6.48± 2.35	
	Agree	7.31±2.47	
Decrease eating fruits and vegetables increased the probability of chronic disease	Disagree	6.85± 2.57	0.050
	No opinion	6.81± 2.35	
	Agree	7.25±2.44	
Eating food rich in fiber cause an increase in satiety and cause feeling in the fullness	Disagree	6.79 ±2.57	0.001
	No opinion	6.64 ±2.51	
	Agree	7.35± 2.36	
The concern in eating fiber isn’t harmful	Disagree	7.49 ±2.39	0.000
	No opinion	6.62 ±2.53	
	Agree	6.81± 2.40	

Food rich in dietary fiber have an unacceptable taste	Disagree	7.44± 2.33	0.000
	No opinion	6.84± 2.47	
	Agree	6.57 ±2.49	
The darker color of bread means containing more fiber	Disagree	7.17± 2.59	0.008
	No opinion	6.71 2.44	
	Agree	7.32 ±2.38	
It is better to consume dietary fiber as supplements	Disagree	7.43± 2.44	0.007
	No opinion	6.68± 2.45	
	Agree	7.12± 2.43	
Peeling fruits decrease the amount of fiber in it	Disagree	6.02± 2.35	0.000
	No opinion	6.32± 2.34	
	Agree	7.59 ±2.37	

One-Way Anova tests used

Significant at the level of *α=0.05

4.9. The Relationship Between Dietary Habits, Knowledge, and Obesity:

The first test was used by chi-square. The result demonstrated a significant relationship for question 4 "eating whole bread" P=0.006, question 8 "drinking enough water more than 10 cups" p=0.025, question 9 "eating nuts twice a week at least" p=0.004, question 10 "eating fish regularly twice a week" p=0.043, and for question 12 "drinking sweet juice daily" p=0.00. However, there was no significant relationship between weight status BMI and the score of knowledge. Here, One-Way ANOVA test was used.

Chapter five

Discussion

This study successfully determined the level of knowledge, dietary practices of the dietary fiber intake among a representative sample of Palestinian adolescents from five districts across the West Bank. The adequate sample size was achieved to answer the questions of the study and to conduct the required statistical analysis. The sample was divided on a comparative basis between gender and districts. And, up to our knowledge, this study is the first study in Palestine that reported, on a comprehensive way, the attitudes of knowledge and the practices regarding dietary fiber among Palestinian adolescents. The main findings of this study were discussed in the following sections.

5.1. Nutritional Knowledge:

The aim of this study was to examine the relationship between nutritional knowledge and nutritional status among Palestinian adolescents. In addition, the study also aims to assess the relationship between socio-demographic factors and the level of fiber-related dietary knowledge and practices. The results showed that nutritional knowledge was inadequate. There was a significant correlation between nutritional knowledge and income level, father's level of education, and gender.

The overall mean nutritional knowledge score was (7.04±2.45) out of 16. However, the score is considered to be insufficient because all items include basic nutritional knowledge that students should normally be aware

of. By comparing these results with the results of previous studies, it was noted that some studies showed a similar low level of awareness or knowledge, while other studies showed a higher level of awareness. For example, there is a study which was conducted by Norlida et al. (2018) among Malaysian adolescents in rural and urban areas. In the study, Norlida et al. asked questions about the dietary fiber food sources, as well as the role of dietary fiber in health. The study found that the mean score of the correct answers was (54.4± 11.3) % (75). Similarly, another study was conducted by Nabeel et al. (2017). The study found that 86% of students from 4 different private schools aged 9 to 13 had a low nutritional knowledge score (9/16). However, Nabeel et al. study evaluated general nutritional and healthy knowledge as they had questions about energy balance and portion size. And, Even though these questions were different from the current study items, a low level of knowledge is reported in both studies (79).

Regarding the gender difference in nutritional knowledge, female students demonstrated a significantly higher level of nutritional knowledge (7.26±2.35) compared to male students (6.79±2.54). This finding is supported by the literature; Wardle et al. (2004) study which reported that female gender has a higher level of nutritional knowledge compared to males. Furthermore, the study reported that there is a higher level of adherence to national food-based dietary guidelines among females compared to males (80). This may be explained by the fact that females

usually pay more attention to their health and diet as they usually have more concern about body weight and body shape (81). What's more, women are more interested in cooking and food preparation so cooking effects and other related information make women generally has a higher level of nutritional knowledge (80).

Despite this, Raquel et al. (2016) reported that there were no statistically significant differences in the nutritional knowledge score between genders among Portuguese adults. However, Men scored lower knowledge, but this lower score did not reach a significant level. This difference can be explained by the differences between the current study with Raquel et al. study in terms of the differences in the characteristics of the sample, such as age group and sampling frame (82). Various levels of nutritional knowledge were reported based on monthly income. The study found that the total knowledge score was higher among students with monthly family income equal to 3000-5000 NIS compared to students with monthly income less than 3000 NIS.

This finding is supported by the literature, in a study conducted in England by K.pamenter et al. (2000) where they reported that knowledge declining with the decline in socioeconomic status (83).One possible explanation is that low socio-economic status had few opportunities to understand health information and to learn about nutritional knowledge. The current study found that parent's qualifications have an impact on fiber knowledge. The fathers who have higher education, their kids achieved higher scores of

knowledge. It is clear that high education of parents could be translated into good nutritional knowledge, decision-making, dietary style and role model that could positively influence adolescent knowledge, eating habits and, consequently, dietary intake (84). Moreover, parents who are better educated can easily use sources of educational materials about healthy food and nutritional information from newspapers, magazines, articles, and so on (83). For better understanding and interpretation of the results in the current study, categorizing the knowledge items into domains that may explain why different questions had different percentages of correct answers. These domains are divided into 6 domains. The first domain is (Dietary fiber food sources items 1,3,4,5,15), second domain (health effects of the dietary fiber items 8,10,12,14), third domain (fiber types and classifications item 11), fourth domain (serving size of fruit and vegetables, dietary fiber recommendation items 2,7), fifth domain (effects of peeling on dietary fiber contents items 9,16), and sixth domain (dietary fiber digestion items 6,13).

The dietary fiber food sources were assessed in items 1, 3, 4, 5, and 15. To begin with item 1, the knowledge item 1 asked about the food that can be eaten to increase dietary fiber intake. Most of the students (73%) answered the question correctly. Besides, in the before mentioned Malaysian study, the majority of the respondents (86.6%) answered the question correctly, too (75). These almost similar percentages of the correct answer may be explained by the fact that this item asked about very basic nutritional

knowledge information. Also, in question 3, most of the students (60.9%) gave the correct answers while in question 4 more than half of the students (55.8%) gave an incorrect answer. In question 5, half of the students answered the question correctly. The lowest correct answered question in this domain was item 15 (sources of dietary fiber) (37 % only give a correct answer). This may be explained by the reason that students may not receive such information from the school curriculum, teachers or family members. While there is a similar study conducted among the Portuguese population, the result showed that the percentage of the correct answer was 51% for a similar question (85). This may be due to differences in the study sample and study populations.

The second domain had four items, examining the effects of dietary fiber on health. In both questions 8 and 10, around half of the students answered the questions correctly (49.9%, 53.8% respectively). The daily recommendation of dietary fiber intake was assessed in item (2), in which only 40% of the students answered this question correctly. A similar question was asked in the Malaysian study, the percentage of the correct answer was also low (27 % for urban and 45.9 % for rural) (75). The other item asked about the number of servings of fruits and vegetables that should be taken every day to achieve the recommended amount of fiber. This item had a very low percentage of correct answers (8.4%). This means that most students do not know the required amounts of fruits and vegetables they should consume every day. However, this percentage of the

correct answer is low compared to a similar study that asked for the same information. This similar study was conducted in Sharjah, United Arab Emirates, with the percentage of the correct answers being similar (31%) for males and (69%) for females (79).

In items 12 and 14, which asked about the health effect of fiber on the intestine, the percentage of correct answers were; 32% and 24.7%, respectively. This means that the students had a very low knowledge about the fiber health effects on intestinal health, and chronic diseases. This rate of incorrect answer reflects a low level of knowledge about the importance of fiber on health. Compared to the Malaysian study, it was reported that 75% of the correct answers were in a question that asked about the effect of fiber in weight reduction specifically (75).

The third domain had only one item (no.11). The item asked about the types of dietary fiber. Nearly 76% of the answers were incorrect. This high percentage of the false answers was expected since this type of information is not common among the general population.

The fourth domain had two questions (Question 2, Question7). Most students did not answer the questions correctly (40 %, 8.4 % respectively). Item 7 (the number of serving sizes of fruits and vegetables) had the lowest percentage of the correct answer compared to all items concerning the knowledge questions. Perhaps this low percentage is due to the lack of nutritional knowledge on the part of their parents or the school curriculum. And adolescents, at this age, always take unhealthy eating behavior and do

not like eating fruit and vegetables, so they were not aware of this information.

The fifth domain had two Items (9, 16) which examined the effects of fruits and vegetables peeling on dietary fiber contents. The percentages of the correct answers were 53.8% and 57.7%. This percentage was higher than what was reported among Romanian people study, that only 10.2% fully supported the statement "that unpeeled fruits had fewer fibers than peeled one (86).

Finally, the sixth domain had two Items; item 6 and item 13. The percentage of correct answers were; 40 %, 44.3%. A similar question was used in a study conducted by Martinho et al. (2013). The item asked about the calorie content in the dietary fiber. In the current study, 45% of the students answered that dietary fiber provides calories. This percentage of the correct answers may be explained by the reason that the students just considered calories as a normal item in dietary components (85).

5.2. Attitude Regarding Dietary Fiber Intake According to Gender:

In the current research, the student's attitudes to dietary fiber intake and health effects were assessed using 14 items. The items were grouped into four domains according to the similarities of the contents to allow a better understanding. First, the first domain regarded the attitudes on health effects of fruits and vegetables intake. Which was represented in Question 1, 2, 4, and Question 9. Second, the next domain was attitudes about whole

grains consumption. This was set out in Question 3, and Question 10. Next, the third domain concerned the attitudes towards dietary fiber consumption in general. Which were seen in Question 5, 7, 8, 11, 12, 13, and Question 14. Finally, the fourth domain covers the attitude of the role of mass media in raising the consumption of fruits and vegetables as seen in Question 6.

The students' beliefs in the health benefits of fruit and vegetables were assessed in the first domain. 86.7% of the students in item 1 and 68% in item 2 agree that consuming fruit and vegetables gives good health and eating fast foods with low vegetables causes weight gain. In addition, in item 4 half of the students agreed that declining intakes of fruit and vegetables could lead to a chronic illness. Also, in item 9, less than half of the students disagreed that consuming fruit and vegetables may cause digestion disorders. The high percentage of positive attitudes towards fruits and vegetable consumption may be attributed to traditional dietary advice which encourages adults and children to increase their intake of fruits and vegetables. Regarding the fiber content in food, 38.5% (42.3% males, 35.1% females) of the students had no opinion about the darker color of bread containing more fiber. This may be explained by students' lack of knowledge about the whole grains and the grains processing that affect the grains color and nutritional values. In addition, the misleading practices that may be used by the manufacturers to offer a fake darker color of the grains products.

The second domain, Question 3 and Question 10 asked about the effect of wholegrain on the digestive system. The students disagree by the percentage of 35.8% in Question 3, and 27% in Question 10 that whole-grains harmed the digestive system. These results are due to the discomfort that may occur after eating food rich in fiber, such as bloating. Therefore, they may think that fiber causes digestive disorder. In the third domain, in Question 5, 57.2% of the students agree that eating food rich in fibers causes an increase in satiety and causes a feeling of fullness. In Question 7, less than half of the students 46%believed that they cannot reach the recommended amount of dietary fiber.

In Question 8, 28.7% of the students think that eating fiber is not harmful. However, in Question 11, 41.1% of the students disagree with this statement. In Question 13, half of the students 47.3% think that consuming fiber as a supplement is better than eating it from natural sources. In Question 14, a good percentage of the students 60.9% had an appositive attitude regarding the effects of peeling fruits decreases fiber content. In the fourth domain, Question 6 low percentage of the students (26.4%) rejected that mass media encourage consumption of dietary fiber, and less than a half had no opinion.

In this study, the results showed that there was a significant difference in eating fast food with low vegetables that causes a weight increase and darker bread color that contains more fiber (females agree that fast food

increases weight more than males while males had no opinion about the statement that darker color of bread means containing more fiber).

Abu-Mweis et al. (2014) reported that males usually eat fast food more than females (87). The cultural restriction on females moving out as compared to males may explain this finding. Whereas males usually stay away from home for a longer time, prefer to eat with friends, and have a limited time to prepare food, females usually stay at home preparing food. Moreover, females may avoid eating fast food as they know that fast food contains higher calories and higher fat.

5.3. Practices Regarding Fiber Intake and Gender:

Regarding the participants' dietary practices related to fiber intake, it was found that more than half of adolescents (59.1% females and 50.1% males) prefer eating chips, chocolate and they prefer it more than eating lupine and nuts. Similar findings were also reported among Bahraini adolescents; 58.9% prefer consuming potato chips rather than eating legumes and nuts as snacks (90).

With regard to fruits and vegetables (fiber-rich food) consumption, 5 items in the practice session were asked in different ways about the different eating habits of fruit and vegetables. Although almost half of the students reported that they eat fresh or cooked vegetables daily, a significant percentage (around 50%) of them reported that when they eat fast food, they do not try to increase their vegetable intake. Also, with regard to traditional cereal consumption, such as Freekah and Burghul, more than

50% of students do not prefer to eat these grains. This may be explained by a number of possible reasons such as the harder texture, the different tastes, the availability of whole meal grains at home, the geographical location, the difficulties in accessing whole grain food in restaurants, or the lack of whole grain products in school cafeteria and canteens as well as the considerable impact of social media impact on food choices. (91).

Regarding traditional cereals consumption such as Freekah and, Burghul, more than 50%of students don't prefer to eat these grains. This may be explained by the harder texture, different taste, availability of whole meal grains at their homes, or may be due to geographical location. Moreover, the difficulties in accessing whole grains food in restaurants, the absence of whole grains products in the school cafeteria and canteens (91). In addition, the considerable impact of social media impact on food choices.

It was reported that 26% of students eat whole-meal bread more than white bread. These findings can be explained due to the sensory characteristics of whole-meal bread when compared to white bread. These attributes refer to the higher price of whole-meal bread as well as its low availability in the supermarket, and the presence of white bread, therefore, a higher consumption of the available type of white bread. An example to that, Pohjanheim et al (2010) reported that adolescents preferred whole grain bread and declared that they are healthier than refined bread. The participants had a positive attitude towards the consumption of whole grain

bread and the adolescents mentioned many reasons for the consumption of whole grain bread such as its soft texture, taste, and fullness (99).

Nearly half of the students prefer to eat processed meat, even if they know it is not a healthy food choice. The taste of processed meat products, the soft texture and the cheap prices compared to home-cooked meat may lead to this relatively high rate of processed meat consumption.

5.4. Overweight and Obesity Prevalence

In this study, the overall prevalence of overweight was 20.8%, obesity was 10.4%, and normal weight was 65% and underweight was 3.8%. In addition, the prevalence of obesity and overweight among adolescents has increased in Palestine. For example, 13.8% and 3.3% of adolescents in a secondary school in Hebron are overweight and obese, respectively (93). Jildeh et al (2002-03) study showed that in East Jerusalem, the prevalence of overweight (24.3%) and (9.9%) of children was obese among Palestinian adolescents (69). Also, Mikki et al. (2009) determined the prevalence of overweight and obesity among Palestinian adults aged (35 ± 11, 2) years. The study showed that the prevalence of overweight/obesity in Ramallah was higher than in Hebron; 12.9%, 11.2% were overweight, while 7.0%, 4.1% were obese in Ramallah and Hebron, respectively (94). Taking this into consideration, our result of overweight and obesity prevalence lies within the reported values in different studies conducted in Palestine.

While there was a significant relationship between BMI categories and eating whole meal bread, the inverse association with cereal consumption for being overweight, and obese, there was no significant relationship between weight status and nutritional knowledge score according to (BMI). These findings can be explained by the fact that cereal rich in fiber has lower energy content, lower glycemic index, and more feeling of satiety. Legarrea et al. (2015), for example, reported that dietary habits are crucial factors in obesity occurrence, such as meal frequency. And, generally, adolescents who eat meals regularly are found to be normal in their weight (95).

Another study found that eating chicken, fish, and potato chips was associated with an increase in body weight among female university students. Chicken and fish eating contain a high amount of calories and fat due to cooking and eating habits, as well as the potato chips that were expected to increase weight due to high fat and energy.

The current study found that fast food consumption is not associated with obesity. This result was surprising, but as our current study was conducted among young age groups, the reason may be that the effect of dietary habits may appear later on or after a few years. Another reason is that the study reported only the practice and did not estimate the portion of the consumed food (96).

Choumenkovitch et al. (2012) found that whole-grain consumption is inversely associated with body weight. Children who consume more than

1.5 whole grain/d serving size have a significantly lower BMI compared to children who consume less than one serving/d. The clear reason for this difference is that the whole grain consumption may have reduced body weight due to slow digestion and delayed carbohydrate absorption, which lead to improved insulin sensitivity and may encourage satiety (97).

5.5. Dietary Habits and Gender:

The present study demonstrated that about 35% of total students (40% of males, 31% of females) eat their meals on a regular basis most of the time. Also, 23% of students (25% males, 22%females) sometimes eat processed meat. In addition, about 46% of students (50% of males, 43% of females) always eat breakfast daily. However, there were significant gender differences in: eating regular meals, eating processed meat, and eating breakfast every day. Males tended to eat regular meals, processed meat, and breakfast more than females every day. These findings are consistent with findings from a variety of studies. Heyam et al., for example, found that 55% of females skipped breakfast. Musaiger et.al also reported that 56% of Bahraini females had skipped breakfast (98). Moreover, Alsabbah et al. (2004) found that girls consume more sweets, vegetables and fruits, and less milk and soft drinks (99). By the same token, Abu-Mweis et al. (2014) reported that the overall mean milk products and breakfast consumption was higher in males than females (4± 2.5, 3.3± 2.6) times a week, respectively.

As can be seen, our results are similar to the findings of Alsabbah and Abu-Mweis concerning fruits and vegetables eating that was higher in females than males, and that skipping breakfast was higher in females. From literature, we observed gender differences in dietary habits that might be correlated with nutritional knowledge.

Chapter six

Conclusion , Recommendations and limitation

6.1. Conclusion:

The level of nutritional knowledge on dietary fiber was insufficient. There was a statistically significant higher level among females compared to males. In addition, there was a statistically lower level among students from low-income families. Moreover, students whose parents have a high education scored substantially higher levels of fiber-related knowledge compared to other groups. The students were unaware of several facts of nutritional knowledge. The majority of students lack knowledge about various items. For example, serving size of fruits and vegetables, dietary fiber recommendation, dietary fiber digestion, dietary fiber classification, and dietary fiber health effects. The dietary habits of the study sample revealed a considerable prevalence of unhealthy dietary practices, such as: skipping breakfast, insufficient fruits and vegetable consumption, lack of eating whole bread, and eating fast food.

The findings from this research confirm that there was a substantial difference between the sexes. Males are more committed to eating meals on a daily basis, eating breakfast, and eating processed meat than females.

Females showed negative attitudes towards the health benefits of legumes in the digestive system. However, there was a marked difference between genders. For instance, females had a noticeable positive attitude more than

males particularly in the case of low-eating vegetables leads to an increase in weight, and darker color of bread means containing more fiber.

The study established a major association between dietary habits and obesity. Considerable prevalence of obesity and overweight was identified. There was a substantial combination of consuming whole-bread, drinking enough water for more than 10 cups, eating nuts at least twice a week, eating fish regularly twice a week, and drinking sweet juice daily. There is also no important relationship between the weight status of the BMI and the knowledge score.

There was a major gap between the sexes. Females tend to eat chips and chocolate rather than to eat lupine and nuts compared to males. There was also a significant relationship with most of the items of attitude and knowledge.

6.2. Recommendation:

The results of this study highlighted the value of implementing a school-based education program to improve nutritional knowledge and promote healthier dietary habits among school students. Also, it aims to draw the attention of policymakers in the Ministry of Education to strengthening school health and nutrition programs.

Since the results have shown a significant association between knowledge and family characteristics, it is necessary to recommend parental involvement in the school education program as this helps to apply healthier dietary habits in the home environment. Moreover, it is worth

suggesting and recommending instructional modules to be incorporated into the school curriculum to encourage food choices and a healthy lifestyle. Therefore, the curriculum for nutrition education should be strengthened.

6.2.1. Research Recommendation

Based on the findings of this research, the following may be suggested for further research. First, similar studies are required to determine the knowledge, attitudes, and practices of dietary fiber among different school-age students. Second, detailed cross-sectional studies are needed to assess the intake of dietary fiber and the factors that influence the intake of fiber. Other studies are important to establish the relationship between fiber intake and health status between different age groups. Third, educational intervention studies are recommended to improve the knowledge and practice of school-age students using new technologies such as Smartphone apps, social media, or other innovative methods. Finally, local studies are required to validate the Food Frequency Questionnaire on fiber intake (FFQ Fiber Screener) in order to adapt the Palestinian cultural food and facilitate the screening studies on fiber intake in different age groups.

6.3. Limitation:

The main limitation in this study was the absence of data on dietary intake due to the lack of a Palestinian food composition table and also the lack of validated methods to evaluate dietary intake within this age group in Palestine. Even though the study sample size was adequate, but the study

included only governmental schools. Since the nature of the study was a cross-section study, it was possible to determine the relationship between the variable and it was not possible to determine the cause and effect of the relationship.

In conclusion, the findings of this study highlighted the value of implementing a school-based education program to improve nutritional knowledge and promote healthy dietary habits among school students.

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Appendix 1

Al- Najah national university

Graduated studies 2020

المعرفة والممارسات الغذائية والتوجهات المتعلقة باستهلاك الألياف الغذائية لدى المراهقين في مدارس الضفة الغربية

أعزاءنا الطلبة والطالبات

نضع بين أيديكم هذا الاستبيان لإنجاز الدراسة المذكورة، نأمل تعاونكم معنا في الإجابة على أسئلة هذا الاستبيان بدقة وموضوعية. لكم كامل الحرية والإرادة في المشاركة في هذا الاستبيان ولكم الحق في أخذ الوقت الكافي للتفكير في المشاركة من عدمها وسؤال الباحث عما ترونه مناسبا والتحدث لأي شخص أو جهة عن هذا الاستبيان. كما يمكنكم الاستفسار عن أي جزء يتعلق في الاستبيان الآن أو فيما بعد وإذا كانت هناك كلمات أو أجزاء غير مفهومة بإمكانكم سؤال الباحث وستجدون الوقت والإجابة الكافيتين. نؤكد لكم بأن كافة المعلومات التي سيتم جمها هي لأغراض البحث العلمي فقط، وسيتم الحفاظ على السرية التامة وعدم استخدام هذه المعلومات لأغراض أخرى.

ولكم منا جزيل الشكر والتقدير

فريق البحث:

الدكتورة: منال بدر ساوي

الأستاذ الدكتور: وليد صويلح

الأنسة: غدير بني نمرة

رقم الاستبانة التسلسلي | | | | | |

معلومات عن المدرسة	
اسم المدرسة	
اسم المديرية التي تتبعها المدرسة	
موقع المدرسة	1- مدينة 2- قرية 3- مخيم
تصنيف المدرسة	1- أساسية دنيا 2- أساسية عليا 3- ثانوية
تاريخ لم البيانات	\ \
ملاحظات جامع البيانات	

القسم الأول: المعلومات الديموغرافية للمشاركين	
تاريخ الميلاد	
الصف	1- الثامن الأساسي 2- التاسع الأساسي 3- العاشر الأساسي
مكان السكن	1- مدينة 2- قرية 3-مخيم
طبيعة العائلة	1- (أسرة نووية) الأب والأم والأولاد 2-(أسرة ممتدة)وجود الجد أو الجدة أو الأعمام
عدد أفراد الأسرة كامله	
عدد الأخوة والأخوات	
مستوي تعليم الأب	1- غير متعلم 2- تعليم أساسي 3- تعليم ثانوي 4- دبلوم \ جامعة 5- ماجستير

	6- غير ذلك اذكره
مستوى تعليم الأم	1- غير متعلم 2- تعليم أساسي 3- تعليم ثانوي 4- دبلوم \ جامعة 5- ماجستير 6- غير ذلك اذكر ه
طبيعة عمل الأب	1- لا يعمل 2- يعمل بوظيفه حكومية 3- يعمل عمل مهني 4- أعمال حرة
طبيعة عمل الأم	1- لا تعمل 2- تعمل بوظيفه حكومية 3- تعمل عمل مهني 4- أعمال حرة
معدل دخل الأسرة	1- اقل من 1500 شيكل شهريا 2-1500- واقل من 3000 شيكل شهريا 3-3000- وأقل من 5000 شيكل شهريا 4- 5000 شيكل فأكثر شهريا

القسم الثاني: التاريخ الطبي والتدخين ونمط الحياة		
هل تعاني من أمراض مزمنة	1-لا 2-نعم	اذكرها
هل تتناول أدوية بشكل دائم	1-لا 2-نعم	اذكرها

هل قمت بعمل عملية جراحية	1-لا 2-نعم نوع العملية تاريخ إجرائها
هل أنت مدخن	1-لا 2-نعم
اذا كان الجواب نعم	1-مدخن منتظم 2- مدخن غير منتظم
نوع التدخين	1-نرجيلة 2-سجائر
مده التدخين	
هل يوجد فرد من أفراد الأسرة مدخن (ويدخن داخل البيت)	1-لا 2-نعم
عدد ساعات النوم	
ساعة الذهاب للنوم	
ساعة الاستيقاظ من النوم	
كيفية الذهاب إلى المدرسة	1-مشيا على الأقدام 2-باستخدام مواصلات
هل تمارس الرياضة	1-نعم بشكل منتظم معدل ------ ساعة يوميا 2-نعم بشكل متقطع: ----- يوم كل أسبوع 3- ----- ساعة يوميا 4-لا أمارس الرياضة إطلاقا
عدد ساعات الجلوس أمام التلفاز أو الأجهزة الخلوية \ يوميا	---------- ساعة يوميا
القسم الثالث(أ): تقييم الحالة التغذوية – القياسات الجسمية	

القياس	قراءه أولى	قراءه ثانية	متوسط حسابي
الطول			
الوزن			

القسم الثالث ب: تقييم الحالة التغذوية- العادات الغذائية

السؤال	دائما	غالبا	أحيانا	نادرا	أبدا
تكون الوجبات في وقت ثابت على مدار اليوم					
أتناول الفواكه الطازجة كاملة أو معصورة بشكل يومي					
أتناول الخضار (نيئة أو مطبوخة بشكل يومي)					
أتناول الخبز الأسمر					
أتناول اللحوم المصنعة					
أتناول الوجبات السريعة					
أتناول منتوجات الحليب بشكل يومي					
أشرب كميه ماء كافيه 10 أكواب فأكثر					
أتناول المكسرات مرتين أسبوعيا على الأقل					
أتناول الأسماك بانتظام مرتين أسبوعيا					
أتناول ثلاث وجبات أساسية يوميا					
أتناول العصائر المحلاة يوميا					
أتناول وجبة الإفطار يوميا					
أتناول الحلويات يوميا					

القسم الرابع: المعلومات الغذائية والممارسات والاعتقادات حول الألياف الغذائية		
الرجاء ضع دائرة حول الإجابة الصحيحة		
1	أي من الأطعمة التالية يمكن تناولها لزيادة كمية الألياف الغذائية	1-منتجات الألبان 2-اللحو م 3-الخضار والفواكه
2	كمية الألياف الغذائية الموصى بها لكل من الذكور والإناث على التوالي	1- 10غم و15 غم\يوميا 2-40غم و50 غم \يوميا 3- 38غم و25 غم \ يوميا
3	أي من الأتية تحتوي كمية اكبر من الألياف الخبز الأبيض أم الخبز الأسود	1-الخبز الأسمر يحتوي عل ألياف أكثر من الخبز الأبيض 2-كمية الألياف متساوية 3-الخبز لا يحتوي على ألياف غذائية
4	فيما يتعلق بكمية الألياف في الفواكه وعصيرها ، أي الجمل صحيحة	1-عصير الفواكه يحتوي على ألياف اقل من الفوا كه التي تؤكل كاملة 2-الألياف ف في عصير الفاكهة مساويه للألياف في الفاكهة نفسها 3-عصر الفاكهة يزيد من تركيز الألياف الغذائية في العصير
5	أي من الأغذية التالية تعتبر مصادر غنية بالألياف	1-البقول (حمص، فول) 2-المكسرات (لوز، جوز، وفستق) 3-كل ما ذكر صحيح
6	أي من الجمل التالية صحيحه فيما يتعلق بهضم الألياف الغذائية	1-يتم هضمها وامتصاصها في المعدة 2-يتم هضمها وامتصاصها في الأمعاء الدقيقة 3-الألياف الغذائية لا تهضم
7	عدد الحصص الغذائية من الخضار والفواكه والتي ينصح بتناولها حسب الهرم الغذائي يوميا هي	1-من 5- 7 حصص 2-من 2- 3 حصص 3-حصة خضار وحصة فواكه
8	التأثيرات الصحية المفيدة للألياف الغذائية	1-تساعد في الحفاظ علة وزن مثالي 2-تحسن عمل كريات الدم الحمراء

		3-تقلل من حساسيه الطعام
9	تختلف الحبوب الغير المقشورة والمقشورة عن بعضها من حيث احتوائها على الألياف ب	1-الحبوب الغير مقشوره وغير مصنعه مصادر جيدة للألياف 2-لا تحتوي الحبوب على ألياف غذائية 3-كميه الألياف تعتمد على طريقة الطبخ
10	وجود الألياف في الوجبات	1-يزيد الشعور بالشبع 2-يزيد الشهية ويؤخر الشعور بالشبع 3-لا تؤثر الألياف على الشعور بالشبع
11	تصنف الألياف الغذائية إلى	1-ألياف ذائبة وألياف غير ذائبة 2-ألياف قابله للهضم وألياف لا تهضم 3-الألياف جميعها متشابهة لا تصنف
12	يوصى بزيادة استهلاك الألياف الغذائية للأمراض التالية ما عدا	1-السمنة 2-مرض السكري 3-فقر الدم
13	تتحول الألياف الغذائية إلى سعرات حرارية في	1-المعدة 2-الأمعاء الدقيقة 3-الألياف لا تعد مصدر للسعرات الحرارية
14	للألياف الغذائية تأثيرات على الأمعاء	1-تزيد من وجود البكتيريا النافعة في الأمعاء 2-تساعد في التخلص من البكتيريا الضارة والنافعة 3-لا يوجد تأثير للألياف على البكتيريا في الأمعاء
15	مصادر الألياف	1-الألياف موجودة في الأغذية من مصدر حيواني فقط 2-الألياف موجودة في الغذائية من مصادر نباتية فقط 3-الألياف موجودة في الأغذية الحيوانية والأغذية النباتية
16	هل يؤثر تقشير الخضار والفواكه على كميه الألياف الغذائية فيها	1-تقشير الخضار والفواكه يقلل من كمية الألياف 2-الألياف موجودة في القشور فقط وتفقد إذا تم تقشير الخضار والفواكه 3-لا تأثير لتقشير الخضار والفواكه على كميه الألياف فيها

الممارسات الغذائية المتعلقة بتناول الألياف الغذائية

الرقم	الفقرة	نعم	أحيانا	لا
1	أتناول الخضار الطازجة أو المطبوخة مع كل وجبة			
2	أتناول الفواكه يوميا			
3	أتناول السلطة بشكل مستمر مع الوجبات الرئيسية			
4	أقوم بفضل الخضار من الوجبة ولا أتناولها			
5	أتناول الخبز الأسمر أكثر من الخبز الأبيض			
6	اختار اللحوم المصنعة (مارتديلا والنقانق) في وجباتي الخفيفة أكثر من الحمص والفلافل			
7	أتناول الشيبس والشوكولاتة كمسليات أكثر وأفضلها على المكسرات والترمس			
8	أتناول العصائر المحلاة أكثر من مخفوق الفواكه الطازجة			
9	أقوم بتناول الحبوب التقليدية مثل البرغل والفريكة كبديل للأرز والخبز الأبيض			
10	عند تناولي الوجبات السريعة اطلب طبق خضار إضافي لزيادة الألياف في الوجبة			

الاعتقادات والتوجهات المتعقلة بالألياف الغذائية

الرقم	الفقرة	أوافق	أعارض	لا رأي لي
1	اعتقد إن الإكثار من اكل الخضار والفواكه يعطيني صحة أفضل			
2	اعتقد انه اكل الوجبات السريعة قليله الخضار تسبب زيادة وزن			

3	اعتقد أن اكل الحبوب الكاملة (القمح البرغل والفريكة يسبب عسر هضم)			
4	اعتقد أن تقليل اكل الخضار والفواكه يزيد احتماليه الإصابة بالأمراض المزمنة			
5	أعتقد أن أكل الأغذية الغنية بالألياف تزيد من الشعور بالشبع وتسبب امتلاء المعدة لفتره أطول بالطعام			
6	اعتقد بان التلفزيون والميديا التي تروج لمنتوجات غذائية تساهم في زيادة استهلاك الأغذية الغنية بالألياف			
7	اعتقد بانه من الصعب تناول كمية الألياف الغذائية المطلوبة يوميا مني			
8	اعتقد أن الاهتمام بتناول الألياف الغذائية لا ضرورة له			
9	اعتقد أن الإكثار من تناول الخضار والفواكه يوميا يسبب اضطرابات هضميه			
10	أعتقد أن زيادة اكل البقول (الحمص والفول) له تأثير سلبي على الجهاز الهضمي عند الأصحاء			
11	اعتقد بان الأطعمة الغنية بالألياف هي أغذية غير لذيذة وطعمها غير مقبول			
12	اعتقد كلما كان لون الخبز أغمق فهدا يعني زيادة كميه الألياف فيه			
13	اعتقد انه من الأفضل تناول الألياف على شكل مكملات غذائية			
14	اعتقد أن تقشير الفاكهة يقلل كمية الألياف فيها			

Appendix 2

المعرفة والممارسات الغذائية والتوجهات المتعلقة باستهلاك الألياف الغذائية لدى المراهقين في مدارس شمال الضفة الغربية

أعزاءنا الطلبة والطالبات

نضع بين أيديكم هذا الاستبيان لإنجاز الدراسة المذكورة، نأمل تعاونكم معنا في الإجابة على أسئلة هذا الاستبيان بدقة وموضوعية. لكم كامل الحرية والإرادة في المشاركة في هذا الاستبيان ولكم الحق في أخذ الوقت الكافي للتفكير في المشاركة من عدمها وسؤال الباحث عما ترونه مناسبا والتحدث لأي شخص أو جهة عن هذا الاستبيان. كما يمكنكم الاستفسار عن أي جزء يتعلق في الاستبيان الآن أو فيما بعد وإذا كانت هناك كلمات أو أجزاء غير مفهومة بإمكانكم سؤال الباحث وستجدون الوقت والإجابة الكافيتين. نؤكد لكم بأن كافة المعلومات التي سيتم جمعها هي لأغراض البحث العلمي فقط، وسيتم الحفاظ على السرية التامة وعدم استخدام هذه المعلومات لأغراض أخرى .

ولكم منا جزيل الشكر والتقدير

فريق البحث:

الأستاذ الدكتور: وليد صويلح

الدكتور: منال بدرساوي

الأنسة: غدير بني نمره

School information	
School name	
District	
Residence	1- City 2- Village 3-Camp
School Category	1-Basic 2- Secondary 3- Higher school
Date of collecting data	\ \

sociodemographic information: first section	
Birth Date	
Grade	1- Eighth grade 2- Ninth grade 3- Tenth grade
Residence	1- City 2- Village 3-Camp
Type of Family	1- Nuclear family (mother ,father, children) 2-Extended family (grandmother ,grandfather, uncles)
Family number	
Number of brothers and sisters living at home	
Number of the family members	
Father's educational level	1- Not educated 2- Primary education 3- Secondary 4- Diploma/University 5- master 6- Others
Mother's educational level	1- Not educated 2- Primary education 3- Secondary 4-Diploma/University 5- master

	6- Others
Father's occupation	1- No work 2- Governmental 3- Professional work 4- Free business
Mother's occupation	1- No work 2- Governmental 3- Professional work 4- Free business
Family income	1- Less than 1500 2- 1500-3000 3- 3000-less than 5000 4- More than 5000

Second section :medical history ,smoking,life style	
Do you have chronic disease	1- Yes 2-No
Do you take permanent treatment	1- Yes 2-No
Do you make previous surgical operation	Type of surgery
Are you smoker	1- Yes 2-No
If the answer yes	1- Regular smoker 2- Irregular smoker
Type of smoking	1-Nagrile 2-Ciggerate
Duration of smoking	
Is there a family member who smokes	1- Yes 2-No
Amount of number sleeping hours	

Time of sleep	
Time of waking up	
How are you going to school	1-On foot 2-By transport
Do you play sport	1- yes ,regularly 2- No, irregular 3- Don't play sport
Amount of hours watching TV	Hour/day ----------

Section 3 –A-: nutritional status assessment-Anthropometric			
Measurements	First reading	Second reading	Average
Height			
Weight			

	Section 3 –B-: nutritional status assessment- dietary habits					
	Question	**Always**	**Most of times**	**Some times**	**Rarely**	**Never**
1	Taking meals at fixed time					
2	Eating whole fresh fruit or drinking juice daily					
3	Eating fresh or cooked vegetables					
4	Eating whole bread					
5	Eating processed meat					
6	Eating fast food					
7	Eating diary product					

	daily					
8	Drinking enough water more than 10 cups					
9	Eating nuts at least twice a week					
10	Eating fish twice a week					
11	Eating 3 basic meals daily					
12	Drinking sweet juice daily					
13	Eating breakfast daily					
14	Eating sweets daily					

Knowledge, Attitude, and Practice Regarding Fiber Intake Section four:		
Please choose the correct answer to the following questions:		
1	Which of the following food can be eaten to increase the intake of dietary fiber:	1- dairy product 2- meat 3- fruits and vegetables
2	The recommended amount of dietary fiber for both males and females is:	1- 10-15 g/daily 2- 40- 50 g/daily 3- 25-38 g/daily
3	The amount of dietary fiber in white bread and whole bread is:	1- Whole bread contains more fiber than white bread. 2- The amount of dietary fiber is the same. 3- Bread does not contain fiber.
4	The amount of dietary fiber in fruit and its juice:	1- Fruit juice contains less fiber than fruits. 2- The amount of dietary fiber in fruit juice and whole fruit is the same. 3- Squeezing fruit increases the amount of fiber in juice.
5	Which of the following food is rich in fiber:	1-Legumes (chickpea, beans) Nuts (wall nuts, peanuts ,almond) 2- 3- All answers are true.
6	Which of the following statement is true regarding dietary fiber digestion:	Digestion and absorption occur in 1- stomach. Digestion and absorption occur in 2- intestine. 3- Dietary fiber is indigestible.
7	The number of fruits and vegetables serving sizes that are recommended according to the diet pyramid:	1- (5-7 serving size) 2-(2-3 serving size) 3- One serving for fruit and one serving for vegetables.
8	The Beneficial effects of	1 -Maintain ideal weight.

	dietary fiber on health:	2-Improve red blood cell function 3- Decrease food allergy.
9	Differences in dietary fiber content between peeled grain and unpeeled grain:	1- Whole grain is good source for fiber. 2-Grains do not contain dietary fiber. 3-The amount of fiber is based on the cooking method.
10	The effects of dietary fiber on meals:	1- Increase satiety. -Increase appetite and delay 2satiety feeling 3- Fiber does not affect satiety feeling.
11	The main types of dietary fiber are:	1- Soluble and insoluble fiber. Digestible and indigestible fiber. 2- 3- All fibers are the same.
12	Diseases that are recommended to increase fiber consumption:	1- Obesity 2- Diabetes 3- Anemia
13	Where does fiber change into a calories:	1- Stomach 2- Small intestine Fiber is not a source of calories. 3-
14	The effects of dietary fiber on intestine:	Increase microbiota in intestine. 1- Help to get rid of harmful and 2- beneficial bacteria. 3- Dietary fiber has no effect on microbiota on the intestine.
15	The sources of dietary fiber:	Fiber only found in animal 1- sources. Fiber only found in plant sources. 2- Fiber found in both plants and

		3- animals foods.
16	Peeling fruits and vegetables affects the amount of fiber in it:	1- Peeling fruits and vegetables decreases the amount of dietary fiber. 2- Fiber only found in peels and peeling causes a fiber loss. 3-Peeling fruits and vegetables does not affect the amount of fiber in it.

Practice regarding dietary fiber intake

number	Paragraph	Yes	Some times	No
1	Eating fresh or cooked vegetables with each meal			
2	Eating fruits daily			
3	Eating salad continuously with each meal			
4	Putting the vegetables aside from ameal rather than eating it			
5	Eating whole bread more than white bread			
6	Eating processed meat(Sausage,)with snack more than eating hummus and falafel			
7	Eating chips and chocolate and prefer it more than nuts and lupine			
8	Drink juice more than cocktail			
9	Eating grains such as burgul and freekeh instead of rice and white bread			
10	Eating vegetables with fast food to increase fiber intake			

Attitude related dietary fiber intake

number	paragraph	Agree	Disagree	No opinion
1	Eating fruits and vegetables promotes good health			
2	Eating fast food with low vegetables induces weight gain			
3	Eating whole grain (freekeh ,burgul, wheat causes dyspepsia			
4	Reducing intake of fruits and vegetables raises the risk of chronic illness			
5	Eating food high in fiber causes increased satiety and fullness			
6	TV and mass media which propagate for certain food products contribute to the increase in food rich in dietary fiber			
7	It is difficult to increase the amount of dietary fiber			
8	It isn't harmful to eat fiber			
9	The increase in the daily consumption of fruits and vegetables causes digestive disorders			
10	The rise in the consumption of legumes harms the digestive system			
11	Food high in dietary fiber has unacceptable taste			
12	A darker color of bread means more fiber			
13	It is better to consume dietary fiber as supplements			
14	Peeling fruits reduces the amount of fiber in it			

جامعة النجاح الوطنية

كلية الدّراسات العليا

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قدمت هذه الأطروحة استكمالا لمتطلبات الحصول على درجة الماجستير في التغذية وتكنولوجيا الغذاء بكلية الدراسات العليا في جامعة النجاح الوطنية، نابلس–فلسطين.

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الملخص

إن السلوك الغذائي غير الصحي، وأسلوب الحياة بين المراهقين في العالم يرتبط ارتباطا وثيقا بانتشار السمنة، ووجود الأمراض غير المعدية. يتجه المراهقون بشكل متزايد نحو تناول الوجبات السريعة والابتعاد عن تناول الفواكه، والخضروات، والألياف الغذائية. إن الدراسات، والمعلومات حول الوعي بأهمية الألياف الغذائية للصحة من قبل فئة المراهقين الفلسطينيين قليلة جدا.

هدفت الدراسة الحالية إلى تقييم مستوى المعرفة، والاتجاهات، والممارسات المتعلقة باستهلاك الألياف الغائية لدى طلاب المدارس الحكومية في الضفة الغربية، وتحديد العوامل التي قد تؤثر في المعرفة، والسلوكيات الغذائية للطلاب. ولتحقيق ذلك تم إعداد استبانة خصيصا لهذا الغرض.

لقد أجريت دراسة مقطعية لمدارس محافظة نابلس، طولكرم، سلفيت، جنين، الخليل الثانوية للذكور والإناث من الصف السابع وحتى العاشر وقد شملت الدراسة 818 طالب وطالبة حيث كان متوسط الأعمار لدى عينة الدراسة 14 عاما. استخدمت الاستبانة كأداة لجمع المعلومات من الطالب وقد اشتملت الاستبانة معلومات عن المعرفة الغذائية (16 فقرة من نوع الاختيار من متعدد بثلاثة بدائل)، والسلوكيات الغذائية (14 فقرة باستخدام مقياس ليكرت الخماسي)، والممارسات الغذائية (10 فقرات). وكذلك تضمنت الاستبانة معلومات ديموغرافية، التاريخ طبي، ونمط الحياة للطلاب. وقد تم تصنيف الطلاب حسب أوزانهم إلى سمين، زيادة في الوزن، وزن طبيعي، نقص في الوزن بناء على مخططات مؤشر كتلة الجسم بالنسبة للعمر لدى منظمة الصحة العالمية، ومركز مكافحة

الأمراض. وقد تم فحص صدق الاستبانة وتبعها إجراء عينة استطلاعية، وحساب معامل الثبات والذي بلغت قيمته لفقرات المعرفة الغذائية 0.82، وللاتجاهات 0.69، وللممارسات الغذائية 0.72 باستخدام معادلة كرونباخ ألفا وهذا مقبول في الدراسات لاستخدام الاستبانة كأداة لأغراض الدراسة.

أظهرت النتائج أن متوسط المجموع الكلي للمعرفة الغذائية لدى الطلاب كان 7 من 16وكان أعلى مجموع للمعرفة الغذائية مرتبط ب الجنس، والوضع الاقتصادي للأسرة، ومستوى تعليم الأب، ولم يكن هناك فروق ذات دلالة إحصائية بين المجموع الكلي للمعرفة، والممارسات الغذائية باستثناء اثنتين من الممارسات الغذائية. وكانت هناك فروق ذات دلالة إحصائية بين الذكور والإناث فيما يتعلق بالممارسات، والتوجهات الغذائية المتعلقة بتناول الألياف الغذائية. أما فيما يتعلق بعلاقة الوزن الذي تم تحديده بواسطة مؤشر كتلة الجسم والمعرفة، والممارسات الغذائية فإنه لا يوجد فروق ذات دلالة إحصائية

الاستنتاج: أظهرت هذه الدراسة بشكل عام إن مستوى المعرفة عن الألياف الغذائية غير كافي لدى الطلاب، حيث كان معدل مستوى المعرفة الغذائية اعلى بين الإناث مقارنة مع الطلاب الذكور مع وجود فروق ذات دلالة إحصائية. وقد تبين إن العادات الغذائية لعينة الدراسة أظهرت انتشار ممارسات غذائية غير صحية.