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**EVALUATION OF SENIOR NURSING STUDENTS'
NUTRITIONAL KNOWLEDGE IN BAGHDAD CITY, IRAQ**

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BY

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**The Institute of Health Sciences
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ETHICS STATEMENT

The thesis entitled “Assessment of Nutritional Knowledge Among University Students” which was prepared and presented as a thesis, was written by myself and in accordance with the scientific, academic rules and ethical conduct. The idea/hypothesis of my thesis solely belongs to my supervisor and to me. The research pertaining to the thesis was conducted by myself and therefore, all of the used sentences and interpretations within the work belongs to me.

I declare the aforementioned issues to be correct.

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ABSTRACT

EVALUATION OF SENIOR NURSING STUDENTS' NUTRITIONAL KNOWLEDGE IN BAGHDAD CITY, IRAQ

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Advisor: Asst. Prof. Dr. Serap AÇIKGÖZ

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All members of society should eat healthily, but university students have particular requirements. They have busy study schedules, eat out more frequently, and are influenced by their peers, just like in the age of independence. They might also favor fast food as a way to save time and money. They are compelled by this entire scenario to consume unhealthy meals like fast food. Therefore, the main objective of this study is to investigate the level of nutritional knowledge among senior students in nursing schools in Baghdad City/Iraq, and the sociodemographic factors affecting their level. The sociodemographic information of the subjects was gathered using a descriptive information form. The questionnaire asked 20 questions items related to nutrition, participants' knowledge of nutrition, and the sources of this knowledge. The mean scores of the participants on the GNKQ-R were 40.39 8.41 for the overall scale, 8.20 2.36 for the sub-dimension of dietary recommendations, 18.26 4.53 for the sub-dimension of food groups, 4.35 2.14 for the sub-dimension of healthy food choices, and 9.57 3.09 for the sub-dimension of diet, disease, and weight control. Also, the study's findings demonstrated a correlation between sociodemographic characteristics and knowledge levels; knowledge of nutrition is one of the elements impacting people's nutritional status and eating habits as individuals, families, and society. An essential tool for assessing how well-nourished an individual, a group, or a community is nutrition knowledge This study's recommendations include implementing dietary guidelines in childcare facilities, schools, hospitals, and workplaces. Menus at fast food restaurants and restaurants should include a list of nutrition information and calorie counts

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Keywords: Nutritional knowledge, Nutrition Nursing, Students ,

ÖZET

ÜNİVERSİTE ÖĞRENCİLERİNİN BESLENME BİLGİLERİNİN DEĞERLENDİRİLMESİ

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Üniversite öğrencileri genellikle aile ortamından ayrılmalarıyla beraber bağımsızlıklarını kazanırlar ve bu kritik dönemde yeme alışkanlıkları değişir. Toplumun tüm bireylerinin sağlıklı beslenmesi gerekirken önemli değişimlerin ve zorlukların olduğu üniversite döneminde beslenme daha da önem kazanmaktadır. Üniversite öğrencilerinin yoğun çalışma programları bulunmakla birlikte daha sık fast food besin tüketmekte, sağlıksız gıdalar tüketme eğilimi göstermektedirler. Üniversite eğitimi gören hemşirelik öğrencileri de hem kendi sağlıklarını korumak ve geliştirmek için hem de hizmet verecekleri nüfustaki sağlıklı beslenme girişimlerini planlayabilmeleri için mezuniyet öncesinde beslenme bilgilerinin değerlendirilmesi bakımından önemli bir grubu oluşturmaktadır. Hemşirelik öğrencileri mezun olmadan önce beslenme konusunda yeterli bilgiye sahip olmaları gerekmektedir. Beslenme bilgisinin yeterli olması yalnızca gıda kaynaklı hastalıkları azaltmada değil, aynı zamanda beslenme konusundaki sağlık eğitimini başlatmada ve yayılmasını sağlamada, böylece daha geniş bir nüfusu etkilemede yardımcı olacaktır. Bu konuda çok fazla araştırma bulunmamakla birlikte hemşirelik bilgisi, gelecekte insanların pratik yaşamlarını etkileyeceği için elzem bir konudur. Bu görüşten hareketle bu çalışmanın amacı, Irak'ın Bağdat Şehrindeki hemşirelik okullarındaki son sınıf ilişkili ve düzeylerini bilgi beslenme öğrencilerinin değerlendirilmesidir. Araştırma evrenini, Irak'ın Bağdat şehrinde bulunan üniversitelerin hemşirelik programlarının son sınıf (4. Sınıf) öğrencileri oluşturmuştur. Araştırmaya 280 hemşirelik son sınıf öğrencisi katılmıştır. Veri toplamak amacıyla; Kişisel Bilgi Formu ve Genel Beslenme Bilgisi Ölçeği kullanılmıştır. Araştırmada elde edilen veriler SPSS (Statistical Package for Social Sciences) for Windows 25.0 programı kullanılarak analiz edilmiştir. Veri değerlendirilirken tanımlayıcı istatistiksel metotları (sayı, yüzde, min-maks değerleri, ortalama ve standart sapma) kullanılmıştır. Ölçeklerin güvenilirliğini test etmek amacıyla “Güvenilirlik Analizi” yapılmıştır. Kullanılan verilerin normal dağılıma uygunluğu test edilmiştir. Normal dağılıma sahip verilerde niceliksel verilerin karşılaştırılmasında iki bağımsız grup arasındaki fark için bağımsız örneklem t testi, ikiden fazla bağımsız grup karşılaştırılmasında ise tek yönlü varyans analizi uygulanmış ve fark bulunduğu durumda fark yaratan grubu bulmak için Bonferroni kullanılmıştır. Normal dağılıma sahip olmayan verilerde

niceliksel verilerin karşılaştırılmasında iki bağımsız grup arasındaki fark için Mann Whitney U testi, ikiden fazla bağımsız grup karşılaştırılmasında ise Kruskal Wallis H testi uygulanmış ve fark bulunduğu durumda fark yaratan grubu bulmak için düzeltilmiş Bonferroni kullanılmıştır. Normal dağılıma sahip olmayan sürekli değişkenler arasındaki ilişki Spearman korelasyon katsayısı ile incelenmiştir. Katılımcıların GNKQ-R puanları ortalama $40,39 \pm 8,41$, Diyet Önerileri alt boyut puanları ortalama $8,20 \pm 2,36$, Besin Grupları alt boyut puanları ortalama $18,26 \pm 4,53$, Sağlıklı Besin Seçimleri alt boyut puanları ortalama $4,35 \pm 2,14$, Diyet, Hastalık ve Kilo Kontrolü alt boyut puanları ortalama $9,57 \pm 3,09$ bulunmuştur. Katılımcıların yaşları ile Besin Grupları alt boyut puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,132$; $p<0,05$); ağırlıkları ile GNKQ-R puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,146$; $p<0,05$); ağırlıkları ile Diyet Önerileri alt boyut puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,136$; $p<0,05$); ağırlıkları ile Besin Grupları alt boyut puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,125$; $p<0,05$), boyları ile Diyet Önerileri alt boyut puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,119$; $p<0,05$); BKİ değerleri ile Genel Beslenme Bilgisi Ölçeği puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,166$; $p<0,05$); BKİ değerleri ile Besin Grupları alt boyut puanları arasında istatistiksel olarak anlamlı pozitif yönlü ($r:0,194$; $p<0,05$) ilişki tespit edilmiştir.

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Anahtar Kelimeler: Beslenme Bilgisi; Beslenme; Hemşirelik, Üniversite Öğrencisi

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INDEX OF ABBREVIATIONS AND SYMBOLS

ACHA	The American College Health Association
ANOVA	One-way Analysis of Variance
BMI	Body Mass Index
DRI	Dietary Reference Intakes
FAO	Food and Agriculture Organization of the United Nations
GNKQ	General Nutrition Knowledge Questionnaire
HEI	Healthy Eating Index
n.d.	No date
NCDs	Noncommunicable Diseases
RDA	Recommended Dietary Allowance
SDV	Standard Deviation
SES	Socioeconomic Status
SMM	Skeletal Muscle Mass
SPSS	Statistical Package for Social Sciences

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1. INTRODUCTION

The significance that food plays in our lives is crucial. Depending on how active they are, most people consume food three or four times daily. Proper nourishment is crucial to one's health and happiness (Haddad *et al.* 2016). Considerable research has recently been focused on the connection between diet and psychological well-being. Following a healthy or Mediterranean dietary pattern, characterized by a high intake of fruits, vegetables, nuts, and legumes; a moderate intake of poultry, eggs, and dairy products; and only occasional consumption of red meat, is associated with a reduced risk of depression, according to epidemiological research (Lassale *et al.* 2019).

Poor nutrition contributes to 11 million deaths worldwide each year, as evidenced by an increase in the prevalence of noncommunicable diseases (NCDs) and a significant burden on health care and population health systems (Collaborators 2019). The importance of nutrition in fostering an immune response to pathogens like COVID-19 has recently come to the forefront in research and therapy for numerous common diseases (Calder 2020) (Bold *et al.* 2020). Malnutrition is prevalent in older populations, amplifying the effects of poor nutrition habits (Griffin *et al.* 2020). Nurse professional groups have worked to improve nurses' nutrition knowledge and develop educational resources to provide nutrition care in response to poor nutrition behavior (Laing and Crowley 2021). Any practice aimed at improving a patient's dietary intake in order to improve their health outcomes is referred to as nutrition care (Cárdenas Zuluaga *et al.* n.d.). Despite efforts to provide basic effective nutrition care in healthcare settings, implementation continues to be difficult. This is linked to health-system pressures (Gillis *et al.* 2019), nurses' perceptions of their roles, and the perspectives of other health-care professionals (Mitchell *et al.* 2018). All the same, for nutrition to be integrated into clinical practice, it is imperative that all health professionals acknowledge nutrition's centrality to both health and disease (Calder 2020).

A systematic review discovered a small but statistically significant correlation between nutritional literacy and dietary well-being. An increase in fruit and vegetable consumption and a decrease in fat intake is associated with increased nutrition literacy.

Better nutrition knowledge is associated with increased consumption of fish, cereals, fiber, calcium, and other food groups. Low intake of sweetened beverages is linked to better nutrition knowledge (Spronk *et al.* 2014).

Another systematic review looked at food literacy and adolescent diet. The study shows that adolescent food literacy may influence dietary habits. Food literacy refers to the knowledge, skills, and behaviors required to meet one's nutritional needs. High levels of nutrition knowledge are also influenced by SES and education. Higher SES and education increase adherence to dietary guidelines (McKinnon *et al.* 2014). Thus, promoting nutrition knowledge seems vital.

More research is needed on university students' eating habits, including skipping meals, frequency of eating, awareness of unhealthy foods, motivations for using fast food, and gender differences in food attitudes.

1.1 Aim of the research

The aim of this study is to evaluate the nutrition knowledge levels of senior students in the nursing schools in Baghdad city of Iraq and related factors.

1.2 Research questions

- What is the nutrition knowledge level of senior nursing students?
- What is the relationship between the nutrition knowledge of senior nursing students and their sociodemographic characteristics?

1.3 Problems

University students typically become independent after the age of 20, and it is during this critical period that their eating habits change. Because of technological advancement, stressful routines, and a lack of time, people are living in the fast lane,

which has increased the demand for prepared or fast food (Onurlubaş and Yılmaz 2013). It was also reported that fast food chains appear to be keeping up with the public's increasing demand for affordable and accessible food (Bondoc *et al.* 2019) (Demircan *et al.* 2019).

Although a healthy diet is important for all members of society, university students have a special need. As in the age of independence, they have busy study schedules, eat out more frequently, and are influenced by their peers. They may also prefer fast food as a time and money-saving strategy. This entire phenomenon drives them to eat unhealthy foods such as fast food. This food is typically made with low-cost, low-quality ingredients such as high-fat meat, added sugar, a lot of salt, saturated fat instead of fresh fruits and vegetables, low-fat meat, and high-quality other ingredients. Fast food is not always "very bad," but eating fast food regularly can have negative consequences. Students also drink soft drinks that contain no nutrients but are high in calories. In addition, nursing students especially those in the 4th level should have adequate knowledge of food nutrition just before graduation. To effectively reduce food-borne illness, it is important to first understand people's food safety knowledge and analyze the factors that influence it. This will allow health educators to better educate the public and spread people's food safety knowledge, ultimately affecting a larger population (Cheng *et al.* 2017) (Sun *et al.* 2016).

1.4 Limitations

The study's limitation on the relationship between nutrition knowledge and a diet that more closely follows dietary guidelines were made without taking into account other factors such as environment, difficulties, and food abundance. Some of the intended respondents not wanting to take part. Challenges to the study could come from a lack of funding or a dearth of relevant literature.

1.5 Assumptions

The study about nursing knowledge is an important topic as it touch their practical life in the future and there is a lack of studies about this topic.

The study assumes that there is lack of knowledge among nursing students about their nutrition as there is no nutritional educational program in their university curriculum.



2. LITERATURE REVIEW

2.1 Nutrition

As a result, proper nutrition is crucial for development and wellbeing. Improved maternal and infant nutrition leads to fewer health problems, stronger immune systems, and less risk during pregnancy and delivery. Children who are physically and mentally well have an advantage in school. People who are provided with adequate nutrition are more likely to work toward ending hunger and poverty. The health of humans is put at risk by any kind of malnutrition. In low and middle-income nations, poor diet and obesity are among the primary causes of death. To promote health and wellbeing across the lifespan, WHO is equipping nations with scientific guidance and decision-making tools to combat malnutrition in all its forms (WHO 2022).

2.1.1 Nutrients Necessary for Life

The Dietary Guidelines encourage people to eat more fruits and vegetables, less sodium, added sugars, and refined grains, less calories, promote and develop healthy eating habits, and maintain a healthy diet low in saturated fats and cholesterol, increasing physical activity, maintaining continuous sports, and drinking water instead of sugary drinks that con These directives also confirm that everyone has a role to play in promoting affordable and accessible ways to support healthy choices that improve body health (FAO 2016).

The human body requires large amounts of these elements. The rate of energy production for basic nutrients and the total energy consumed to control human weight are highly correlated. The recommended daily intake of foods that produce energy has been identified. Carbohydrates are an important primary energy source during physical activity, especially anaerobic activity (Rolfes *et al.* 2014). There is a link between carbohydrate consumption and cognitive functions like memory and attention in the elderly, which may help students achieve academic goals. Carbohydrates are a vital source of energy for the brain, which it uses in many daily functions (Lutz *et al.* 2014).

A healthy carbohydrate intake ranges from 45 to 65 percent of daily energy intake (FAO 2016). Sugar must be kept to less than 10% of total calorie intake. Adult males should consume 30–38 grammes of total dietary fibre daily, while females should consume 21–25 grammes. The human body requires growth, development, infection control, and cell replacement. The researchers proposed that football players limit carbohydrate intake due to widespread carbohydrate overuse. The main hypothesis is that the low carbohydrate consumption found in the current study is linked to contributors' misconceptions about carbohydrate's role in developing performance, as approximately 40% of the young people were unaware or incorrectly approved that certain easily accessible high carbohydrate foods in Brazil (breads and potatoes) must be avoided (Jaeken *et al.* 2019).

Protein is vital to the body because it replaces amino acids that are broken down to create huge amounts of energy inside the cells. 5 1/2 oz. protein per day is advised (FAO 2016). When consumed in moderation and without consuming too much saturated fat, foods containing up to 35% fat can be beneficial to health. However, the risk of insufficient NFA intake increases when oils and fats make up less than 20% of total calories. 5-10% of one's daily caloric intake should come from linoleic acid, and 1–2% from linolenic acid. Minerals play an essential role in the human diet. Bone health, neuron communication, and intracellular oxygen transport all rely on them. They're also important in many other ways. Minerals make up a substantial portion of the micro-nutrients required by the organism and can be broken down further into macro- and micro-minerals (Rolfes *et al.* 2014).

Water is a vital ingredient that must be drank continuously in order to thrive. In just a few days, you will perish without water. Daily food and drink consumption must include sufficient amounts of water to meet the body's needs. Water demands are determined by nutrition, humidity, ambient temperature, and human activity. Vitamins are organic substances needed by the body but without producing any form of energy. Both bone health and oxygen transportation depend on adequate intake of minerals and vitamins. While vitamins do not give energy, many work as coenzymes to aid fat, carbohydrate, and protein metabolism (Lutz *et al.* 2014).

Dietary fat is an essential nutrient that aids in the absorption of nutritional components in the human body. Due to its high density, fat is the first important and essential nutrient to be restricted during periods of calorie restriction. Dietary fats are an important source of major fatty acids that are required to maintain many biological processes in the human body (Rolfes *et al.* 2014).

2.1.2 Adequate and Balanced Nutrition

The ability to think critically about food is crucial to making wise dietary decisions. A lack of sufficient nutritional information is a major contributor to dietary difficulties, which in turn have negative effects on eating habits. To effectively promote healthy consumption, it is also crucial to have a firm grasp on local dietary norms and attitudes. There is evidence linking college students' eating practices and nutritional status to an increased risk of cardiovascular disease (Zarrazquin Arizaga *et al.* 2018).

Assessment of dietary status is suitable to evaluation growth outlines and recognizes signs and symptoms connected with malnutrition. Adequate dietary pattern is determined from a dietary assessment of clinical, anthropometric, socioeconomic, biochemical, and drug-nutrient collaboration impacts. Every one of these mechanisms replicates nutrient necessities for best health and dietary status (Getnet *et al.* 2017; Soldavini 2019).

2.1.3 The Effect of Inadequate and Unbalanced Nutrition on Health

Nutritional performance and reduced risk of diet-related chronic illness have both been shown to improve with the help of evidence provided by health care professionals. Malnutrition can be prevented and, in many cases, corrected, as acknowledged by Litvin *et al.* (2016) and confirmed by various dietary assessment methods (Brown *et al.* 2020). However, it often goes undetected due to a lack of education, awareness, clinical procedures, and tools to treat it. Repetitive dietary screening was found to be four approved out of the hospitals tested in the states using atypical approaches, according to the results of a study carried out in 25 European countries.

Recently, nutrition associated with health disorders such as: obesity, cancer, diabetes, and cardiovascular diseases are regularly diagnosed, and establish to have important influence on human health. More than 80% of the above-mentioned chronic illness burden is a consequence of the dietary factors and lifestyle. Therefore, it is important to progress dietary intake and lifestyle through taking nutritionally healthy and balanced nutrition to overcome numerous of hostile medical conditions (Perlstein *et al.* 2016).

2.1.4 Socio-Cultural Environment and Its Relationship

Due to its growing significance in human health, the connection between food and health is one of the most important topics that researchers seek to clarify. To better improve and develop strategies and programs that aim to change dietary behavior to improve quality of life and reduce diseases and health problems associated with unhealthy diets in particular, it is essential that university students have a firm grasp on the connection between diet and human health (Grunert 2017). Giving university students' educational lectures about the most important skills and behaviors necessary to have a full awareness of what a healthy diet pattern means will make them the ability to make decisions regarding healthy food choices throughout their lives. Also, many researchers have suggested that interventions should be specific to the target group, namely young people, in order to help them act on their health intentions (Menozzi *et al.* 2017).

For example, social media is an important and effective means of effective communication between individuals and institutions (for example, university administrators and researchers specializing in nutrition), in order to provide important information. This aspect is necessary and useful in developing and promoting healthy diets that do not lead to problems and eating disorders. In addition to this, it is necessary to have facilities and discounts in the prices of high-cost foods in campus facilities, such as cafeteria halls, and also to buy more healthy food options such as fruits and vegetables. It is also necessary to set up a nutritional information station where students can view healthy food options and take the plunge to buy their favorite type (Sogari *et al.* 2017).

2.2 The Importance of Nutrition in University

University students develop their personality and a sense of self-identity during their transition from adolescence to adulthood, and also gain new experiences and personal freedoms, which leads to great challenges while eating healthy. Students must balance many different responsibilities and activities such as adopting healthy lunch habits. During this period, many students indulge in unhealthy eating habits such as consuming fast food, skipping meals, and not engaging in physical activities, which lead to their weight gain (Evagelou *et al.* 2014).

Many studies have shown that college students do not get enough of certain nutrients due to their lifestyle. In 2017, Tam *et al.* (2017) found that college students do not consume the recommended amounts of vegetables and fruits in their little research. Furthermore, the results suggest that over 40% of the sample rarely or never ate fruit. People in their twenties and thirties are encouraged to eat five servings of fruits and vegetables per day (Tam *et al.* 2017). Participants were assessed in order to determine the link between theoretical understanding and practical application. After much investigation, the authors found that there was a connection between education and dietary well-being. Nutritionally literate participants were 25% more likely to meet the recommended daily intake of fruits and vegetables. Vegetables, fruits, fiber, and fat consumption among the more educated persons was closer to the dietary guidelines than it was among the less educated. Researchers found that maternal education in these areas has a significant impact on the nutritional status of their offspring (Haq *et al.* 2020).

2.3 The Importance of Nursing Nutrition

Nurses have a vital role in ensuring that patients receive beneficial nutritional outcomes from the food care they receive in hospitals, including conducting dietary evaluations and providing dietary recommendations (Sauer *et al.* 2016). Therefore, it is essential for nursing students to acquire academic and practical nutritional abilities, such as an understanding of the benefits and forms of nutrition. The Mediterranean diet is frequently cited as a healthy choice that can aid in the prevention of certain

ailments. Students of nursing should know who is being advised to follow a Mediterranean diet and why (Galilea-Zabalza *et al.* 2018). Clinical training for nursing students is quite similar to actual nursing work, including the long hours and varied nature of the work. It's well known that nurses working long shifts may go without eating owing to exhaustion (Phiri *et al.* 2014). Additionally, studies in Greece indicated that there were changes in typical eating practices when working in shifts, especially for late-shift teams, who ate more and consumed fewer meals in comparison to the day-shift group. Numerous studies have shown that adopting healthy eating habits can lessen the severity of many diseases (Martinez-Ferran *et al.* 2020).

2.4 Studies on the Nutrition Knowledge Level of Nursing Students

Having adequate nutritional knowledge is critical to eating healthy foods that protect against future diseases and health issues. People are perplexed by the multitude of differing views on what constitutes a healthy diet. Many students found many different and sometimes contradictory sources about proper nutrition, according to a scientific study of undergraduate students who exercise regularly. So you won't know if your diet is healthy or not. Also, getting nutrition lectures from experts can help students develop and improve their nutritional status (Abebe *et al.* 2017).

Consuming acceptable nutrition knowledge may translate into consuming healthy nutrition. Moreover, (Hong *et al.* 2016) studied the challenges of maintaining a healthy nutrition. Majors in nutrition were compared to those in unrelated fields in terms of body mass index. It was hypothesized that nutritionists would have a better grasp of nutrition and have a healthier body mass index than their peers who did not study the subject.

Previous research revealed unfavourable dietary habits (e.g. more consumption of carbonated beverages, a little consumption of proteins vegetables; and fruits, sweets and fast food, skipping breakfast). These poor nutritional habits may contribute to obesity (Farsi and Elkhodary 2017). (Shaikh *et al.* 2016). According to another study (Moradi-Lakeh *et al.* 2017), poor nutritional habits include eating less vegetables and

fruits and more fat. The researchers also found that processed food consumption was high (Moradi-Lakeh *et al.* 2017).

Another study (Kowalska 2015) compared university students' knowledge of fats. In this study, over 70% of students in the US believe fats are a “negative food factor”. The researchers found that food majors have a healthier BMI than non-food majors. Nutritionists are expected to know more than other students because they have studied topics and lectures on how to eat healthy meals and their benefits on the body's health and prevention of many diseases. Thus, special knowledge in the field of healthy nutrition can greatly benefit public health (Kowalska 2015).

A cross-sectional study found a link between improved nutritional knowledge and healthier eating habits for protein, dairy, fruit, and whole grains. The study also identified diet knowledge as a key factor in each case. When asked about a particular diet, students seem to be able to use their knowledge to make a better choice. This study's findings suggest that overall healthier consumers have diet knowledge (Zaborowicz *et al.* 2016).

Although many studies have found no link between nutritional knowledge and dietary habits, there are a few that have found one, albeit weakly. Another study examined 537 students from two Midwestern universities' knowledge, attitudes, and use of nutrition labels. The study found that while most students found diet labels useful and easy to read, there was an inherent distrust in their accuracy and truthfulness (Widmer *et al.* 2015).

2.5 The Role of Nurses in Increasing The Nutrition Knowledge Level of Nursing Students

University students' behavior can change at a certain point in their lives. In fact, the active social role of university students is illustrated by their readiness for change. Therefore, the university campus works as an effective environment that allows students to overcome the obstacles that limit the adoption of a healthy diet, healthy habits, and regular exercise and other effective activities. The positive changes that

students make during their years of study at the university will continue beyond that, and therefore it becomes a habit that he commits to applying daily (El-Ahmady and El-Wakeel 2017).

It is now understood that understanding about nutrition can help promote healthier eating habits, which in turn can help people maintain a healthy weight. One of the most crucial variables influencing a lifetime of good eating that supplies the human body with what it needs to function well is knowledge of nutrition. When a person is able to determine what he needs to eat to maintain or improve his health, he is better equipped to make food choices that promote his wellbeing and reduce his risk of developing chronic diseases and other health issues (Bottcher *et al.* 2017).

Nutritional literacy, as stated by (Yahia *et al.* 2016), is an important factor in promoting healthier eating habits and, thus, maintaining a healthy body weight, avoiding overweight and obesity. When people understand the connection between their diet and their health, they are more likely to make healthy food choices and maintain a healthy weight. It has been shown that even a basic knowledge of nutrition influences the decisions that people make about what to eat. Several research have shown that people's lack of information about dietary guidelines contributes to their disregard for healthfulness while making meal choices.

Therefore, improving nutritional education and interventions may help reduce the prevalence of chronic disease and boost people's overall health and well-being. In order to guarantee the health of society as a whole, people need to learn how to maximize the health benefits of a nourishing diet. Therefore, nutritional education in a community places an emphasis on consumption performance patterns by increasing understanding of food value in an effort to enhance dietary behaviors and, ultimately, one's nutrition status (Barbosa *et al.* 2016).

It is believed that a group or population can benefit from a more varied diet if it is educated on proper nutrition. Those who recognize the connection between poor diet and health problems are better able to maintain a healthy weight and eat in a balanced manner. This demonstrates that increasing one's knowledge of nutrition can be a

commendable method for preventing and managing disease. Among college students, healthier dietary outcomes are positively correlated with increased awareness of nutritional requirements (Haq *et al.* 2020).

The healthy consumers have more information about nutrition, which leads to better eating choices that can aid in weight loss and maintenance. Studies have shown that learning to make excellent choices about what to buy early in life is crucial to setting a lifetime pattern of responsible spending. The Healthy Eating Index (HEI) is just one of many methods that may be used to determine the state of a population's diet. Nutritional quality is measured by the Healthiness of Eating Index (HEI) based on how closely the food is prepared in accordance with the Nutritional Guidelines. The key advantage of this approach is that it evaluates the nutritional content of a person's diet rather than simply the quantity of food they consume. There are 12 parts to the Healthy Eating Index that all have something to do with the Dietary Guidelines for Americans (Zaborowicz *et al.* 2016).

Numerous studies have shown that young adults are particularly vulnerable to weight gain and poor dietary decisions throughout their time at university. Some research has revealed that undergraduates would rather put on weight than lose it. The development and promotion of good nutrition campaigns, such as less meat options around campus, will have a significant impact on college students' dietary habits. The university-aged population is particularly in need of better education and mentoring in regards to adopting healthy eating habits (Mueller *et al.* 2018). Another study shows that the majority of nursing students surveyed did not know that carbs will be distributed at their peak during the day (van Szic *et al.* 2015), providing more evidence that people lack nutritional understanding. It is more important for them to be able to provide suitable assistance to their patients, thus they are being taught to provide general dietary recommendations to their future patients (Waldhäusl *et al.* 2016).

Another study looked into whether or not increased food-related knowledge could account for healthier dietary habits (Inghram 2019). Two groups of 257 undergraduates were studied, with their dietary knowledge and practices measured and compared. The primary results showed that students' awareness of the recommended

daily allowance for fruits and vegetables did not increase throughout the course of the semester. The number of college students who ate fruit increased by 5% daily, but there was no significant change in the number of students who ate vegetables every day. Nutrition education did translate to the students' foods in certain aspects of nutrition, but not in general, and had a progressive influence on dietary understanding. Evidence like this demonstrates the value of dietary education as a means to improve eating habits, however education isn't always the right ingredient for bringing about lasting behavioral change. Having a progressive outlook on nutrition was linked to better nutritional knowledge, as shown in a separate study (Abebe *et al.* 2017). However, the results of this study showed that only men have the nutritional information to make an informed decision about how much fruits and vegetables to consume on a daily basis.

3. MATERIAL AND METHOD

3.1 Variables of the study

Dependent variable: Nutrition knowledge score

Independent variable: Variables on the descriptive information form

3.2 Inclusion criteria of the research

- A senior nursing student at one of the universities where the research was planned to be conducted
- A native Arabic speaker
- Volunteer to participate in the research

3.3 Exclusion criteria of the research

- Not filling out data collection tools completely

3.4 Study setting

The population of the study consisted of senior (4th-year) students from the nursing programs of universities in Baghdad, Iraq. The nursing program is found in 7 universities in the city of Baghdad. Five of these universities have senior students. Universities and the number of students are presented in Table 1. The total number of senior nursing students is 1,028. The simple random sampling method, which is accepted as one of the probability-based sampling methods, was used for the selection of the sample. The following formula was used to calculate the sample size: $n = N \times t^2 \times p \times q / d^2 (N-1) + t^2 \times p \times q$. The theoretical t-value of the research is 1.96, with a confidence interval of 95% and a sampling error of 0.05. When the research data were

placed in the simple random sampling formula, the sample size that could represent a population of 1,028 people was calculated as at least 280 subjects, based on a confidence interval of 95% and a sampling error of 0.05. For the participants in the sample to represent the population appropriately in terms of the university they were enrolled in, their age, gender, and similar variables, the percentage of students at each university was reflected in the sample as in the population. In a sample of two hundred and eighty subjects, the number of students for each university, their percentages, and the number of students in the sample were determined and presented in Table 1.

The power of the study was calculated on the “G*Power-3.1.9.2” software package. As a result of the analysis applied to a sample of two hundred and eighty individuals, the effect size was found to be 0.146 at $\alpha=0.05$, and the power of the study, which was calculated as post-hoc, was found as 0.688. The minimum required power value for post-hoc analysis is 0.67. In this study, the power analysis value was at an acceptable level, and the number of data was adequate.

Table 3.1 The number and percentage of senior students in nursing programs of universities in Baghdad, Iraq, and the number of students from each university in a sample of 280 subjects

Universities with nursing programs in Baghdad Province	N	%	n
Universities with senior students			
Baghdad University	150	14.60%	41
AL-Israa University College	197	19.16%	53
AL-Bayan University	232	22.57%	63
Al-Farabi University College	208	20.23%	57
Al-Hadi University College	241	23.44%	66
Total	1,028	100.00 %	280

3.5 Data collection tools

Descriptive Information Form

A descriptive information form was used to determine the socio-demographic characteristics of the participants. The form consisted of 20 items about participants' university, age, gender, body weight, height, marital status, number of children, place

of residence, place of the longest residence, education level of parents, number of siblings, employment status, economic status, smoking status, alcohol consumption, doing regular exercise, presence of chronic diseases, presence of nutrition-based diseases, and knowledge of nutrition and the source of this knowledge (See Appendix 1). The body weight and height data were used to calculate participants' body mass index (BMI). The BMI classification defined by the WHO and given in Table 3.3 was taken as a reference. BMI is a measure of nutritional status in adults. It is defined as a person's weight in kilograms divided by the square of the person's height in meters (kg/m²) (WHO 2010).

Table 3.2 BMI classification

Classification	BMI (kg/m²)
Underweight	< 18.50
Normal weight	18.50 – 24.99
Pre-obesity	25.00 – 29.99
Obesity (class 1)	30.00 – 34.99
Obesity (class 2)	35.00 – 39.99
Obesity (class 3)	≥ 40.00

General Nutrition Knowledge Questionnaire (GNKQ-R)

We conducted the validity and reliability study of the English version of the General Nutrition Knowledge Scale (GNKQ-R), which was developed by Kliemann *et al.* (2016). The GNKQ-R consists of four sections, each of which assesses a different area of nutrition knowledge: (1) dietary recommendations; (2) food groups; (3) healthy food choices; (4) diet, disease, and weight control. The total score of these four sections gives the general nutrition knowledge score. In addition, these sections can be evaluated independently of each other. The questions on the 5th part of the scale are about demographic data and nutrition, and this part is not included in the calculation of the total score. In section 1, "dietary recommendations", each correct answer is assigned one point. The subsections of the first and third questions are handled as separate items. The maximum score that can be obtained from this section is 18. In Section 2, "food groups", each correct answer is assigned one point. The subsections of the 1st, 2nd, 3rd, 4th, 5th, and 6th questions are handled as separate items. The

maximum score that can be obtained from this section is 36. In section 3, “healthy food choices”, each correct answer is assigned one point. The maximum score that can be obtained from this section is 13. In section 4, “diet, disease, and weight control”, each correct answer is assigned one point. The subsections of the thirteenth question are considered separate items. The maximum score that can be obtained from this section is 21. Each correct answer given to the multiple-choice questions on the questionnaire is assigned 1 point, and each incorrect answer is assigned 0 points. The total score that can be obtained from the scale is 88, and as the score obtained from the scale increases, the level of nutrition knowledge is considered higher. Cronbach's α coefficient for the total scale is 0.93 (Kliemann *et al.* 2016).

Mo'ath and Attlee (2021) conducted a validity and reliability study of the Arabic version of the questionnaire. As in the original version of the scale, there are four sections in the Arabic version, each of which evaluates a different nutrition knowledge area: (1) dietary recommendations; (2) food groups; (3) healthy food choices; (4) diet, disease, and weight control. One question in section 1 and one in section 3 found in the English version of the questionnaire were excluded from the Arabic version due to cultural sensitivity and applicability. The total score that can be obtained from the questionnaire is 86. Cronbach's α coefficient for the total score of the scale is 0.91, and it varies between 0.70 and 0.83 for each section (Mo'ath and Attlee 2021).

The reliability of the GNKQ-R was tested for this study. It was carried out to test whether the statements on the questionnaire showed consistency within the subscales they belonged to and whether all of the statements measured the same subject (Ural and Kılıç 2006: 286). In the reliability analysis, Cronbach's α coefficient value, varying between 0 and 1, is interpreted as follows: 0.00-0.40, not reliable; 0.40-0.60, low reliability; 0.60-0.80, quite reliable; 0.80-1.00, highly reliable (Tavşancıl 2005: 19). When the results were examined, the reliability coefficient of the GNKQ-R was found as 0.750 for the total scale, 0.402 for the dietary recommendations sub-dimension, 0.634 for the food groups sub-dimension, 0.492 for the healthy food choices sub-dimension, and 0.563 for the diet, disease, and weight control sub-dimension. The internal consistency of the questionnaire was found to be good (See Appendix 2).

3.6 Ethical approval

The approval of the Iraq Ethics Committee (Protocol Number 97, Date: 30/12/2022), was obtained to collect the study data (See Appendix 3). Institutional permission was obtained from the universities where the research was planned to be conducted (See Appendix 4). Permission of the author for the use of the Arabic scale was obtained (See Appendix 5). On the front side of the data collection form, the purpose of the research was explained, and there was a section regarding students' consent for participation in the research. Only students who consented to participate in the research were allowed to fill out the questionnaire. A sample of the consent form was given to the students.

3.7 Data analysis

The data obtained in the research were analyzed on the SPSS for Windows 25.0 software package. Descriptive statistical methods (frequency, percentage, min-max values, mean and standard deviation) were used for data analysis. Reliability analysis was conducted to test the reliability of the scales. The conformity of the data to the normal distribution was tested. The normality of data can be examined with the Q-Q Plot (Chan 2003: 280-285). In addition, the normal distribution of data also depends on the skewness and kurtosis values, which range between ± 3 (Shao 2002). In the comparison of normally distributed quantitative data, independent samples t-test was used for the difference between two independent groups, and the one-way analysis of variance was employed for comparing more than two independent groups. In case of a difference, the Bonferroni test was used to find the group that caused it. In the comparison of non-normally distributed quantitative data, the Mann-Whitney U test was used for revealing the difference between two independent groups, and the Kruskal-Wallis H test was employed for the comparison of more than two independent groups. In case of a difference, Bonferroni correction was used to find the group that caused it. The relationship between non-normally distributed continuous variables was examined using the Spearman correlation coefficient.

The results of the normality analysis of the GNKQ-R used in the study are given in (Table 3.4). The skewness and kurtosis values of the data were between ± 3 , and this indicated a normal distribution. Results showed that mean scores on the total GNKQ-R and the sub-dimensions of "dietary recommendations," "healthy food choices," and "diet, disease, and weight control" had a normal distribution, but that the "food groups" sub-dimension score did not.

Table 3.4 The normality analysis results of the GNKQ-R used in the study

The scale and subscales	Skewness	Kurtosis	Results
General Nutrition Knowledge Questionnaire (GNKQ-R)	-0,257	0,040	Normal
Dietary recommendations	-0,087	-0,319	Normal
Food groups	-0,457	0,044	Non-normal
Healthy food choices	-0,028	-0,127	Normal
Diet, disease, and weight control	-0,274	-0,094	Normal

4. RESULTS

Participants' characteristics

Participants' mean age was 25.90 ± 5.66 , and the mean BMI was 25.11 ± 4.07 . Of the participants, 61.8% were male, 70.4% were single, 21.1% had children, 67.5% lived with their family, and the place of longest residence of 77.5% was a province. Mothers of 10% of participants and fathers of 2.9% were not literate. Also, 81.1% of the participants had three or more siblings, 57.1% of them were employed, and 58.9% of them stated that their income was equal to their expenses. According to the findings, 36.4% of the participants were smokers, 5.7% used alcohol, 57.1% exercised regularly, 12.9% had a chronic disease, 12.9% had a nutrition-related disease, 43.2% had previously obtained information/received education about nutrition, and 30.4% were found to have received this information from their family and/or friends. The examination of participants' BMI showed that 53.6% of them had normal weight (See Table 4.1).

Table 4.1 Distribution of participants by their socio-demographic characteristics

Variables		Mean	SD
Age		25,90	5,662
Weight		72,71	16,06
Height		1,69	0,11
BMI		25,11	4,07
Variables		n	%
University	Baghdad University	41	14,6
	Al-Farabi University College	57	20,4
	Al-Hadi University College	66	23,6
	AL-Bayan University	63	22,5
	AL-Israa University College	53	18,9
Gender	Male	173	61,8
	Female	107	38,2
Marital status	Single	197	70,4
	Married	83	29,6
Having children	Yes	59	21,1
	No	221	78,9
Accommodation	Campus dormitory	34	12,1
	Family home	189	67,5
	Sharing a home with friends	15	5,4
	Alone	40	14,3
	Others	2	0,7

Table 4.1 Distribution of participants by their socio-demographic characteristics
(Continued)

Variables		n	%
Place of the longest residence	Village/town	42	15,0
	District	21	7,5
	Province	217	77,5
Mother's education	Not literate	28	10,0
	Literate	47	16,8
	Elementary school	50	17,9
	Middle school	50	17,9
	High school	51	18,2
	University	54	19,3
Father's education	Not literate	8	2,9
	Literate	26	9,3
	Elementary school	29	10,4
	Middle school	34	12,1
	High school	76	27,1
	University	107	38,2
Siblings	One	10	3,6
	Two	43	15,4
	≥Three	227	81,1
Status of employed	Yes	160	57,1
	No	120	42,9
Income	Income < expenses	80	28,6
	Income = expenses	165	58,9
	Income > expenses	35	12,5
Smoking	Yes	102	36,4
	No	178	63,6
Alcohol	Yes	16	5,7
	No	264	94,3
Exercise	Yes	160	57,1
	No	120	42,9
Chronic diseases	Yes	36	12,9
	No	244	87,1
Nutrition-related chronic diseases	Yes	36	12,9
	No	244	87,1
Having received nutrition education/information	Yes	121	43,2
	No	159	56,8
Source of education/information	Family and/or friend	85	30,4
	School	57	20,4
	Media	82	29,3
	Health personnel	56	20,0
BMI	Underweight	3	1,1
	Normal weight	150	53,6
	Pre-obesity	97	34,6
	Obesity (class 1)	22	7,9
	Obesity (class 2)	6	2,1
	Obesity (class 3)	2	0,7
Total		280	100,0

Table 4.2 gives descriptive statistics of the total and sub-dimension scores of the GNKQ-R for the research question “What is the nutrition knowledge level of senior nursing students?” Participants' mean scores on the GNKQ-R were found as 40.39 ± 8.41 for the total scale, 8.20 ± 2.36 for the dietary recommendations sub-dimension, 18.26 ± 4.53 for the food groups sub-dimension, 4.35 ± 2.14 for the healthy food choices sub-dimension, and 9.57 ± 3.09 for the diet, disease, and weight control sub-dimension.

Table 4.2 Descriptive statistics for the GNKQ-R used in the study

The scale and sub-dimensions	Min	Max	Mean	Standard deviation
GNKQ-R	15,00	61,00	40,39	8,41
Dietary recommendations	2,00	14,00	8,20	2,36
Food groups	3,00	28,00	18,26	4,53
Healthy food choices	0,00	11,00	4,35	2,14
Diet, disease, and weight control	0,00	17,00	9,57	3,09

Findings on the relationship between participants' nutrition knowledge and socio-demographic characteristics

Participants' mean scores on the total and sub-dimensions of the GNKQ-R were compared by their sociodemographic characteristics for the research question "What is the relationship between nutrition knowledge and socio-demographic characteristics of senior nursing students?" In the comparison, independent samples t-test was used for the comparison of two independent groups, and the one-way analysis of variance was used for the comparison of more than two independent groups for the total GNKQ-R and dietary recommendations, healthy food choices, and diet, disease, and weight control sub-dimensions. To compare the food groups sub-dimension scores, the Mann-Whitney U test was used for two independent groups, and the Kruskal-Wallis H test was employed for more than two independent groups (See Table 4.3).

There was a statistically significant difference between participants' mean scores on the total GNKQ-R and the food groups sub-dimension according to their universities ($p < 0.05$). As a result of the paired comparison test performed to determine which

group the difference originated from, it was found that the mean scores of participants who were from Al-Hadi University College on the total GNKQ-R and the food groups sub-dimension were higher than the scores of those from AL-Israa University College.

A statistically significant difference was found between participants' mean scores on the dietary recommendations sub-dimension according to their gender ($p < 0.05$). It was determined that male participants had higher scores on this sub-dimension than female participants.

There was a statistically significant difference between participants' mean scores on the food groups sub-dimension according to their place of residence ($p < 0.05$). As a result of the paired comparison test conducted to determine which group the difference came from, it was found that the food groups sub-dimension scores of the participants living in a dormitory were higher than the scores of those living in other places.

There was a statistically significant difference between the mean scores of the participants on the "healthy food choices" and the "diet, disease, and weight control" sub-dimensions according to the place of the longest residence ($p < 0.05$). As a result of the paired comparison test, it was determined that the "healthy food choices" and "diet, disease, and weight control" sub-dimension scores of the participants whose place of the longest residence was a province were higher than the scores of those whose place of the longest residence was a village/town.

There was a statistically significant difference between the mean scores of the participants on the "diet, disease, and weight control" sub-dimension according to the presence of chronic disease ($p < 0.05$). Participants who had chronic disease had higher mean scores on this sub-dimension than those who did not.

A statistically significant difference was found between the mean scores of the participants on the "food groups" sub-dimension according to their source of nutrition information/education ($p < 0.05$). As a result of the paired comparison test performed to determine which group the difference originated from, it was found that the participants who obtained nutrition information/education from the health personnel

had higher scores on this sub-dimension than those whose source of information/education was family and/or friends.

No statistically significant difference was found between participants' mean scores on the total GNKQ-R in terms of the following variables: gender, marital status, the status of having children, place of residence, place of the longest residence, mother's education, father's education, number of siblings, employment status, income, smoking status, doing regular exercise, presence of chronic disease, presence of nutrition-related chronic disease, and obtaining information/receiving education on nutrition and the source of this information/education ($p>0.05$).

There was no statistically significant difference between participants' mean scores on the dietary recommendations sub-dimension in terms of the university of the participant, marital status, the status of having children, place of residence, place of the longest residence, mother's education, father's education, number of siblings, employment status, income, smoking status, doing regular exercise, presence of chronic disease, presence of nutrition-related chronic disease, and obtaining information/receiving education on nutrition and the source of this information/education ($p>0.05$).

There was no statistically significant difference between participants' mean scores on the food groups sub-dimension by gender, marital status, the status of having children, place of residence, place of the longest residence, mother's education, father's education, number of siblings, employment status, income, smoking status, doing regular exercise, presence of chronic disease, presence of nutrition-related chronic disease, and the status of obtaining information/receiving education on nutrition ($p>0.05$).

No statistically significant difference was determined between participants' mean scores on the healthy food choices sub-dimension by the variables of the participant's university, gender, marital status, the status of having children, place of residence, mother's education, father's education, number of siblings, employment status, income, smoking status, doing regular exercise, presence of chronic disease, presence of

nutrition-related chronic disease, and obtaining information/receiving education on nutrition and the source of this information/education ($p>0.05$).

No statistically significant difference was determined between participants' mean scores on the diet, disease, and weight control sub-dimension by the variables of the participant's university, gender, marital status, the status of having children, place of residence, mother's education, father's education, number of siblings, employment status, income, smoking status, doing regular exercise, presence of nutrition-related chronic disease, and obtaining information/receiving education on nutrition and the source of this information/education ($p>0.05$).

There was a statistically significant difference between the participants' mean scores on the total GNKQ-R, dietary recommendations sub-dimension, and food groups sub-dimension according to their BMI classes ($p<0.05$). As a result of the paired comparison test conducted to find out the source of the difference, it was found that participants who were in the pre-obesity class had higher mean scores than those with a BMI class of normal weight.

Table 4.3 Comparison of participants' mean scores on the total GNKQ-R and its sub-dimensions by their socio-demographic characteristics

Variables		GNKQ-R		Dietary recommendations		Food groups			Healthy food choices		Diet, disease, and weight control	
		Mean	SD	Mean	SD	Mean	SD	M	Mean	SD	Mean	SD
University	Baghdad University ¹	39,59	10,01	7,66	2,62	18,07	4,44	19,00	4,61	2,37	9,24	3,77
	Al-Farabi University College ²	40,25	8,26	8,37	2,39	18,05	3,96	18,00	4,30	2,47	9,53	3,06
	Al-Hadi University College ³	42,29	7,60	8,27	2,66	19,55	4,52	20,00	4,48	1,93	9,98	2,71
	AL-Bayan University ⁴	41,62	8,64	8,60	2,08	18,38	5,29	19,00	4,51	1,91	10,13	3,10
	AL-Israa University College ⁵	37,38	7,22	7,89	2,03	16,91	3,92	17,00	3,87	2,11	8,72	2,88
	F-test	3,059		1,317		13,244 ^{KW}			0,978		1,955	
	p	0,017*		0,264		0,010*			0,420		0,102	
	Post-hoc	3>5		-		3>5			-		-	
Gender	Male	40,05	8,52	8,44	2,34	17,92	4,64	19,00	4,26	2,26	9,43	3,03
	Female	40,95	8,25	7,82	2,37	18,82	4,32	19,00	4,50	1,94	9,80	3,20
	t-test	-0,870		2,131		1,361 ^z			-0,927		-0,972	
	p	0,385		0,034*		0,174			0,355		0,332	
Marital status	Single	39,77	8,01	8,10	2,27	17,98	4,17	19,00	4,27	2,20	9,41	3,08
	Married	41,88	9,18	8,45	2,58	18,93	5,28	20,00	4,54	2,00	9,96	3,11
	t-test	-1,820		-1,111		1,731 ^z			-0,955		-1,366	
	p	0,071		0,267		0,083			0,341		0,173	
Having children	Yes	41,61	8,85	8,56	2,69	18,83	5,40	19,00	4,46	1,80	9,76	2,93
	No	40,07	8,29	8,11	2,27	18,11	4,28	19,00	4,33	2,23	9,52	3,14
	t-test	1,248		1,181		-1,071 ^z			0,419		0,524	
	p	0,213		0,241		0,284			0,676		0,601	

Table 4.3 Comparison of participants' mean scores on the total GNKQ-R and its sub-dimensions by their socio-demographic characteristics (Continued)

Variables		GNKQ-R		Dietary recommendations		Food groups			Healthy food choices		Diet, disease, and weight control	
		Mean	SD	Mean	SD	Mean	SD	M	Mean	SD	Mean	SD
Accommodation	Campus dormitory	41,18	9,16	7,97	2,18	19,47	5,11	20,00	4,26	2,49	9,47	2,98
	Family home ²	40,50	8,29	8,28	2,39	18,08	4,29	19,00	4,39	2,00	9,75	3,11
	Alone ³	40,48	9,15	8,13	2,54	18,90	5,20	20,00	4,25	2,55	9,20	3,32
	Others ⁴	37,53	6,37	8,06	2,16	16,41	3,78	16,00	4,35	2,12	8,71	2,66
	F-test	0,763		0,201		8,118 ^{KW}			0,070		0,858	
	p	0,515		0,895		0,044**			0,976		0,463	
	Post-hoc	-		-		1>4			-		-	
Place of the longest residence	Village/town ¹	38,19	8,29	8,45	2,14	17,74	4,86	17,00	3,57	2,14	8,43	3,02
	District ²	39,57	7,77	7,67	2,63	17,71	4,82	18,00	4,24	1,79	9,95	2,82
	Province ³	40,90	8,46	8,21	2,39	18,42	4,45	19,00	4,52	2,15	9,76	3,10
	F-test	1,951		0,770		0,994 ^{KW}			3,507		3,485	
	p	0,144		0,464		0,608			0,031*		0,032*	
	Post-hoc	-		-		-			3>1		3>1	
Mother's education	Not literate	41,11	7,53	8,79	2,15	2,28	4,55	17,00	4,07	2,28	9,93	2,92
	Literate	39,13	9,55	8,19	2,57	17,34	4,79	17,00	4,30	2,25	9,30	3,66
	Elementary school	40,82	7,45	8,10	2,30	18,96	4,33	19,50	4,12	1,79	9,64	2,83
	Middle school	40,86	8,43	8,34	2,33	18,40	4,35	19,00	4,34	2,07	9,78	2,75
	High school	41,86	8,54	8,45	2,62	19,18	4,22	20,00	4,71	2,27	9,53	2,87
	University	38,93	8,51	7,65	2,13	17,41	4,84	19,00	4,44	2,28	9,43	3,48
	F-test	0,948		1,098		7,206 ^{KW}			0,512		0,221	
	p	0,450		0,362		0,206			0,767		0,953	

Table 4.3 Comparison of participants' mean scores on the total GNKQ-R and its sub-dimensions by their socio-demographic characteristics (Continued)

Variables		GNKQ-R		Dietary recommendations		Food groups			Healthy food choices		Diet, disease, and weight control	
		Mean	SD	Mean	SD	Mean	SD	M	Mean	SD	Mean	SD
Mother's education	Not literate/Literate	40,56	8,48	8,29	2,24	18,21	4,97	18,50	4,24	2,39	9,82	3,34
	Elementary school	39,52	7,09	7,45	2,46	17,79	4,00	18,00	4,10	1,82	10,17	2,79
	Middle school	41,44	9,11	8,41	2,40	18,79	4,44	20,00	4,32	2,03	9,91	2,91
	High school	39,21	9,51	8,33	2,60	18,21	4,69	19,00	4,01	2,19	8,66	3,30
	University	41,09	7,67	8,22	2,20	18,28	4,51	19,00	4,71	2,13	9,88	2,91
	F-test	0,772		0,869		1,314			1,351		2,396	
	p	0,544		0,483		0,859			0,251		0,051	
Siblings	One/two	40,04	8,66	8,15	2,35	18,34	4,29	19,00	4,40	2,12	9,15	3,31
	≥Three	40,48	8,37	8,22	2,38	18,25	4,60	19,00	4,34	2,16	9,67	3,04
	F-test	-0,344		-0,179		-0,107			0,160		-1,108	
	p	0,731		0,858		0,915			0,873		0,269	
Employment status	Yes	40,46	8,81	8,39	2,43	18,10	4,78	19,00	4,34	2,29	9,63	3,20
	No	40,32	7,90	7,96	2,27	18,48	4,19	19,00	4,38	1,95	9,50	2,96
	t-test	0,137		1,504		0,480 ^z			-0,144		0,350	
	p	0,891		0,134		0,631			0,885		0,726	
Income	Income < expenses	39,99	8,01	7,96	2,18	18,38	4,48	19,00	4,14	2,25	9,51	3,22
	Income = expenses	40,89	8,47	8,34	2,45	18,33	4,26	19,00	4,52	2,08	9,71	3,03
	Income > expenses	39,00	9,07	8,11	2,43	17,71	5,84	19,00	4,09	2,19	9,09	3,14
	F-test	0,860		0,709		0,428 ^{KW}			1,148		0,606	
	p	0,424		0,493		0,807			0,319		0,546	

Table 4.3 Comparison of participants' mean scores on the total GNKQ-R and its sub-dimensions by their socio-demographic characteristics (Continued)

Variables		GNKQ-R		Dietary recommendations		Food groups			Healthy food choices		Diet, disease, and weight control	
		Mean	SD	Mean	SD	Mean	SD	M	Mean	SD	Mean	SD
Smoking	Yes	41,10	7,88	8,38	2,33	18,57	4,40	19,00	4,48	2,18	9,67	2,80
	No	39,99	8,71	8,10	2,39	18,09	4,62	19,00	4,28	2,13	9,52	3,26
	t-test	1,085		0,956		-0,906 ^z			0,748		0,374	
	p	0,279		0,340		0,365			0,455		0,708	
Doing regular exercise	Yes	40,32	8,52	8,23	2,42	18,07	4,51	19,00	4,50	2,13	9,53	3,18
	No	40,50	8,30	8,18	2,31	18,53	4,58	19,00	4,16	2,16	9,64	2,99
	t-test	-0,178		0,174		0,812 ^z			1,321		-0,312	
	p	0,859		0,862		0,417			0,188		0,756	
Chronic diseases	yes	42,58	7,77	8,14	2,33	19,28	4,17	20,00	4,53	1,78	10,64	3,05
	No	40,07	8,47	8,21	2,38	18,11	4,58	19,00	4,33	2,20	9,42	3,08
	t-test	1,676		-0,175		-1,675 ^z			0,521		2,224	
	p	0,095		0,861		0,094			0,603		0,027*	
Nutrition-related chronic diseases	yes	41,89	8,84	8,47	2,37	18,72	4,84	20,00	4,39	1,92	10,31	3,26
	no	40,18	8,35	8,16	2,37	18,20	4,50	19,00	4,35	2,18	9,47	3,06
	t-test	1,140		0,728		-1,038 ^z			0,106		1,520	
	p	0,255		0,467		0,299			0,916		0,130	
Having received nutrition education/information	Yes	41,08	8,67	8,31	2,34	18,48	4,49	19,00	4,45	2,19	9,84	3,37
	No	39,87	8,21	8,12	2,39	18,10	4,58	19,00	4,28	2,11	9,37	2,87
	t-test	1,191		0,680		-0,878 ^z			0,630		1,238	
	p	0,235		0,497		0,380			0,529		0,217	

Table 4.3 Comparison of participants' mean scores on the total GNKQ-R and its sub-dimensions by their socio-demographic characteristics (Continued)

Variables		GNKQ-R		Dietary recommendations		Food groups			Healthy food choices		Diet, disease, and weight control	
		Mean	SD	Mean	SD	Mean	SD	M	Mean	SD	Mean	SD
Source of information/education	Family and/or friends ¹	38,53	7,74	8,11	2,35	17,26	4,62	17,00	4,08	1,94	9,08	2,77
	School ²	40,72	9,43	8,11	2,60	18,23	4,63	19,00	4,53	2,36	9,86	3,50
	Media ³	41,21	7,77	8,30	2,30	18,82	4,25	19,00	4,57	2,14	9,51	2,99
	Health personnel ⁴	41,71	8,95	8,30	2,30	19,02	4,55	20,00	4,27	2,22	10,13	3,24
	F-test	2,161		0,163		8,315 ^{KW}			0,891		1,486	
	p	0,093		0,921		0,040*			0,446		0,219	
	Post-hoc	-		-		4>1			-		-	
BMI	Normal weight ¹	39,24	8,42	7,99	2,43	17,61	4,27	18,00	4,18	2,20	9,45	3,17
	Pre-obesity ²	42,12	8,00	8,74	2,33	19,08	4,83	20,00	4,60	1,90	9,70	2,85
	Obesity ³	40,73	8,99	7,53	1,87	18,97	4,48	20,00	4,43	2,56	9,80	3,52
	F-test	3,589		4,417		10,047 ^{KW}			1,135		0,281	
	p	0,029*		0,013*		0,007*			0,323		0,755	
	Post-hoc	2>1		2>1		2>1			-		-	

*p<0.05 M: Median

^z: Mann-Whitney U test

^{KW}:Kruskal-Wallis H test

The results of the Spearman correlation analysis conducted to investigate the correlation of the GNKQ-R and its sub-dimensions with age, height, and weight variables are given in Table 4.3. It was found that there was a statistically significant positive correlation between participants' age and the food groups sub-dimension scores ($r:0.132$; $p<0.05$). There was a statistically significant positive correlation between participants' weight and their mean scores on the total GNKQ-R ($r: 0.146$; $p<0.05$). A statistically significant positive correlation was found between participants' weights and the dietary recommendations sub-dimension scores ($r: 0.136$; $p<0.05$). There was a statistically significant positive correlation between participants' weight and the food groups sub-dimension scores ($r: 0.125$; $p<0.05$). Moreover, a statistically significant positive correlation was found between participants' height and their mean scores on the total GNKQ-R ($r: 0.166$; $p<0.05$). There was a statistically significant positive correlation between participants' height and the food groups sub-dimension scores ($r: 0.194$; $p<0.05$). There was a statistically significant positive correlation between participants' BMI and the food groups sub-dimension scores ($r: 0.040$; $p<0.05$).

Table 4.4 Correlations between participants' age, height, and weight and their mean scores on the total GNKQ-R and sub-dimensions

The scale and sub-dimensions		Age	Weight	Height	BMI
GNKQ-R	r	0.059	0.146*	0,166**	0,040
	p	0.329	0.015	0,005	0,503
Dietary recommendations	r	0.055	0.136*	0,068	0,119*
	p	0.360	0.023	0,253	0,047
Food groups	r	0.132*	0.125*	0,194**	-0,005
	p	0.027	0.036	0,001	0,932
Healthy food choices	r	-0.078	0.053	0,073	-0,008
	p	0.192	0.376	0,224	0,892
Diet, disease, and weight control	r	0.000	0.047	0,057	0,004
	p	0.998	0.434	0,341	0,948

* $p<0.05$ ** $p<0.01$

5. DISCUSSION

This chapter provides an overview of the study's statistical analysis findings, a discussion of how they relate to the study's objectives, and additional commentary on how these objectives are supported by the existing literature and research. People are living in the fast lane as a result of technological innovation, demanding schedules, and a lack of time, which has boosted demand for prepared or fast meals (Onurlubaş and Yılmaz 2013) (Bondoc *et al.* 2019) (Demircan *et al.* 2019). In addition to helping to reduce food-borne illness, understanding people's food safety knowledge and examining the elements that determine it can help spread food safety information and have an impact on a larger population (Cheng *et al.* 2017) (Sun *et al.* 2016). Thus, the study is aimed to investigate nutritional knowledge among senior students in nursing schools in Baghdad City/Iraq and the sociodemographic factors that affect their level.

This Study presents the results of a study that evaluated nursing students' nutritional knowledge levels because nurses are better equipped to serve as nutrition educators and counselors by involving their patients in conversations that would advance their understanding of disease prevention and management through nutrition.

The results showed that 36.4% of the participants smoked, 5.7% drank alcohol, 57.1% regularly exercised, 12.9% had a chronic disease, 12.9% had a disease related to nutrition, 43.2% had previously received nutrition information/education, and 30.4% had received this information from family or friends. This finding was supported by Kim, Kim, and Kim (2015), who found that significant determinants of dietary attitudes included issues with food habits, interest in nutrition and health, physical activity, and alcohol use.

A statistically significant difference existed. Participants' mean scores on the GNKQ-R overall and the food groups sub-dimension varied in a statistically significant way depending on their colleges. Participants from Al-Hadi University College had higher mean scores on both the food groups sub-dimension and the overall GNKQ-R than participants from AL-Israa University College. This finding was consistent with (Chepulis and Mearns 2015), who found that the mean overall nutritional knowledge scores were low. However, overall scores were higher for students who had

received nutrition instruction, indicating that improvements in nutrition knowledge were consistent across all ethnic groups and that age had no influence on the results.

Results agreed with Abebe *et al.* (2017) who confirmed that having adequate nutritional knowledge is critical to eating healthy foods that protect against future diseases and health issues. Results also showed that men need more nutritional recommendation, that's agreed that poor nutritional habits may contribute to obesity (Farsi and Elkhodary 2017). (Shaikh *et al.* 2016). According to another study (Moradi-Lakeh *et al.* 2017), poor nutritional habits include eating less vegetables and fruits and more fat. The researchers also found that processed food consumption was high (Moradi-Lakeh *et al.* 2017). This data were also agreed with those from Moradi-Lakeh *et al.* 2017, which showed unhealthy eating patterns. Additionally, findings that supported the idea that obesity may be caused by bad eating habits (Farsi and Elkhodary 2017). (2016) Shaikh *et al.* Another study (Moradi-Lakeh *et al.* 2017) found that unhealthy nutritional practices include consuming more fat and fewer vegetables and fruits. The researchers discovered that a lot of processed food was consumed. Additionally, in a study that examined university students' knowledge of fats (Kowalska 2015). According to this study, more than 70% of American students think that fats are a "bad food element". Researchers discovered that those who major in food had a healthier BMI than others who don't. Because they have studied themes and listened to lectures on how to eat nutritious meals and their advantages for the body's health and the avoidance of various ailments, nutritionists are expected to know more than other pupils. Thus, having specialized knowledge in the area of nutritious diet can significantly advance public health (Kowalska 2015).

Likewise concurred with Zaborowicz *et al.* (2016) who found a connection between better nutritional knowledge and healthier eating practices for protein, dairy, fruit, and whole grains. The study also determined that each case's crucial element was diet knowledge. Students appear to be able to use their knowledge to make a better decision when asked about a specific diet. The results of this study indicate that generally healthier consumers are knowledgeable about diet. There are a few researches that have discovered a relationship between nutritional awareness and eating behaviors, even though it is tenuous. Another study looked at the attitudes, knowledge, and use of nutrition labels among 537 students from two institutions in the Midwest. The survey discovered

that although the majority of students considered diet labels helpful and simple to read, there was an underlying mistrust in their veracity and honesty (Widmer *et al.* 2015).

Also, results agreed with the study of Green, G. (2021) That informed Nursing students from the novice group had better eating habits than the advanced and senior groups, Additionally, Mediterranean nutritional knowledge had a positive indirect effect on eating habits through subjective nutritional knowledge. Therefore, subjective nutritional knowledge partially mediated the relationship between Mediterranean nutritional knowledge and eating habits. Specifically in relation to when assessing the nutritional state of healthcare consumers, and Kim (2015) show that nurses have insufficient nutritional understanding.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Ten research out of the 250 listed studies matched the inclusion criteria; seven of these studies additionally looked at the eating habits and health practices of nurses. The compilation and analysis of the data revealed two themes. Nursing students' eating habits and health practices show a lack of nutrition knowledge for proper self-care. Nursing students lack the professional capacity to provide patients with good nutrition care due to a lack of nutrition knowledge (Laing and Crowley 2021).

This study was conducted to identify the level of nutritional level among the senior students' in Baghdad city/ Iraq and to examine the relationship between the level of knowledge and sociodemographic factors conclusion knowledge of nutrition is one of the factors influencing people's nutritional status and eating behaviors as individuals, families, and societies. Understanding nutrition is a crucial tool for determining how well-nourished a person, a group, or a community is. In order to distinguish and measure nutrition knowledge and its influence on dietary behavior and diet-health awareness, researchers have been working to design and develop

reliable and valid questionnaires. Numerous studies have shown that a person's ability to follow dietary advice can be influenced by their knowledge of nutrition.

6.2 Recommendations

Based on the results of this study, the present study recommends decision-makers and nurses the following:

- Increase Nutritional education-based intervention for managing obesity in the adult population leads to weight loss, the adjustment of eating patterns, and a decrease in the consumption of saturated fat, sweets, and drinks.
- Use educational intervention in people that have trouble adhering to multi-component lifestyle intervention, lifestyle interventions are the best option for managing obesity in the adult population.
- Raise awareness by using altered food intake patterns using social media

Also, Healthy food environments can be achieved through a variety of methods. These consist of:

- Nursing students should Implement nutrition guidelines in daycare centers, schools, hospitals, and workplaces
- Nursing students should offer financial incentives to supermarkets or farmers' markets to locate their operations in unserved areas
- Having calorie counts and nutrition facts listed on restaurant and fast food menus.

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APPENDIXES

APPENDIX 1. Personal Information Form

APPENDIX 2. General Nutrition Knowledge Questionnaire (English and Arabic)

APPENDIX 3. Ethics committee approval from Iraq (Turkish and English)

APPENDIX 4. Facilitating the Mission from Iraq from government and private colleges
(Turkish and Arabic)

APPENDIX 5. Permission for the use of the scale (General Nutrition Knowledge Questionnaire)

APPENDIX 1. Personal Information Form





APPENDIX 2. General Nutrition Knowledge Questionnaire (English and Arabic)





















Arabic Version





















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APPENDIX 5. Permission for the use of the scale (General Nutrition Knowledge Questionnaire)



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