

Evaluation of egg consumption and nutritional knowledge levels among pregnant women in Konya city centre

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ABSTRACT

This study evaluated the sociodemographic characteristics, health information, frequency of food group consumption, egg consumption and nutritional knowledge levels among pregnant women. The study sample included 449 pregnant women living in Meram, Selçuklu and Karatay, the central districts of Konya province. The mean age of the participants was 28.88 ± 5.99 years. When educational status was evaluated, it was found that 31.6% of the participants had a primary education, 55.2% were employed and the average age at marriage was 23.55 ± 3.01 years. In terms of body mass index during pregnancy, 21.2% were classified as obese, and the most commonly reported condition was diabetes. The higher educational level of pregnant women was associated with higher egg consumption. Moreover, the average scores for egg consumption among individuals with normal body mass index were higher than those who were overweight and obese. Thus, we determined that egg consumption among pregnant women significantly varied according to their nutritional knowledge levels ($p < 0.05$) and that higher nutritional knowledge levels were associated with increased egg consumption. The majority of the pregnant women had a moderate level of nutritional knowledge; however, a significant portion of the participants had inadequate to moderate levels of knowledge regarding egg consumption and their egg consumption scores were also low. Based on the main findings of the study, we conclude that increasing the nutritional knowledge levels of pregnant women and ensuring that an adequate amount of eggs are included in their dietary plans during pregnancy is important for maternal health.

INTRODUCTION

Pregnancy, which can be characterized as an allograft, involves numerous adaptive mechanisms from the mother. During this process, numerous physiological changes occur, such as the differentiation of nutritional requirements and metabolic activities (Haider and Bhutta, 2017). The optimisation of required energy and nutrient intake, increased nutrient absorption from the intestines, and decreased elimination of nutrients through the gastrointestinal system are among the primary adaptations observed during pregnancy. The primary purpose of all adaptations is to maintain physiological and anatomical balance, support fetal growth and prepare for lactation (Soma-Pillay et al., 2016). To achieve successful pregnancy, maternal diet should meet the nutritional needs of the developing fetus and the requirements of the lactation (Haider and Bhutta, 2017). It has been observed that pregnant women are among the most affected individuals facing inadequate and unbalanced nutrition-related problems globally. Clinical findings indicate that inadequate and unbalanced nutrition can have negative effects on maternal and fetal health (Mendez and Kogevinas, 2011).

Many factors, such as socioeconomic status, illnesses and physiological changes related to pregnancy, influence nutritional characteristics. Determining an individualised, appropriate nutrition plan not only facilitates favorable gestation

but also helps protect the health of the mother and fetus. At this point, the consumption of animal-based foods, which are sources of protein, fats and certain vitamins and minerals, is recommended, during pregnancy. Eggs should be prioritised in the dietary programmes of pregnant women because of their high biological value protein content, their positive effects on maternal nutrition and intrauterine development and as a source of riboflavin, folate, vitamins B12, D and E, as well as growth factors (Iannotti et al., 2017; Gray, 2019).

Higher levels of nutritional knowledge among consumers is known to facilitate the adoption healthy eating habits, create adequate and balanced nutrition conditions and reduce the incidence of nutrition-related diseases. During pregnancy, it is particularly important for pregnant women to have a high level of nutritional knowledge to maintain nutrient reserves, support healthy fetal development and maintain the health of the mother and offspring after birth. The aim of this study was to evaluate the sociodemographic characteristics, health information, food group consumption frequency, egg consumption and nutritional knowledge levels among pregnant women living in Meram, Selçuklu and Karatay, the central districts of Konya province.

MATERIALS and METHODS

The study sample consisted of 450 pregnant women in different trimesters. Participants were selected using a simple

random sampling method based on voluntary participation. In this context, descriptive research methods were used initially to explain the concepts related to the subject. Subsequently, a survey, as a data collection tool, was conducted to seek answers to the research problems. The findings obtained from the administered surveys were then analysed and evaluated. Upon evaluation of the data, one participant's survey was deemed invalid and the data from 449 participants were subjected to statistical analysis.

The survey implemented in the study consists of five sections. 'Sociodemographic Characteristics' and 'Health Information' of the participants were evaluated in the first two sections. The sections titled 'Food Group Consumption Frequencies', 'Nutritional Knowledge Levels', and 'Assessment of Egg Consumption', developed by the researcher using various sources of related literature, constituted the remaining sections of the survey.

Statistical analyses were performed using the SPSS (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, US) software version 25.0. To examine the sociodemographic characteristics, health information and egg consumption of the participants, the frequency and percentage distributions of the variables were analysed using descriptive statistical methods. To assess whether egg consumption varied according to the participants' descriptive characteristics, independent

RESULTS

Information regarding the participants' sociodemographic characteristics is presented (Table 1).

The participants' ages at marriage ranged from 19-32 years, with an average age of 23.55 ± 3.01 years. The mean body weights before and during pregnancy were 63.03 ± 11.25 and 68.60 ± 11.25 kg, respectively. Based on pre-pregnancy body mass index (BMI), 3.8% of the participants were underweight, 53.9% had a normal weight, 33.2% were overweight and 9.1% were obese. During pregnancy, the BMI distributions were 44.8%, 34.1% and 21.2% for normal weight, overweight and obese, respectively. Moreover, 6% and 90% of the participants had experienced miscarriage and had planned pregnancies, respectively. No smoking or alcohol consumption was reported during the pregnancy period among the participants. The rates of those who had never consumed tobacco and alcohol were 92.2% and 96.4%, respectively. However, 4.9% of the participants reported having previously smoked cigarettes, whereas 0.9% reported that they had consumed alcohol. Moreover, 2.9% stated that they quit smoking and 2.7% stated that they quit alcohol after the diagnosis of pregnancy. Among the participants 75.1% had no history of illness during their pregnancy. The most common condition observed was diabetes, with a prevalence of 9.4%. When examining pre-pregnancy health conditions, 81.3% of participants had no pre-existing health

Table 1. Sociodemographic characteristics of the participants.

Characteristics	Group	n	f (%)	$\bar{x} \pm SD$
Age	18–25	176	39.2	28.88 ± 5.99
	26–35	201	44.8	
	36–45	72	16.0	
	Illiterate	9	2.0	
Educational status	Literate	43	9.6	-
	Primary education	142	31.6	
	High School	130	29.0	
	University	113	25.2	
	Postgraduate	12	2.7	
Employment status	Employed	248	55.2	-
	Unemployed	201	44.8	
Social security status	Social Insurance Institution	254	56.6	-
	Green Card	53	11.8	
	Private Insurance	26	5.8	
	Pension Fund	81	18.0	
	No	35	7.8	
Number of family members	2	204	45.4	2.81 ± 0.88
	3	148	33.0	
	4	77	17.1	
	5	20	4.5	

n: number of people, f: frequency, \bar{x} : arithmetic mean, SD: standard deviation.

samples t-tests and one-way ANOVA tests were utilised. To determine the group that exhibited significant differences, a post-hoc (LSD) test was performed. A p value of <0.05 was accepted as statistically significant in all analyses.

issues, whereas 8.2% reported a history of thyroid disease.

Information regarding participants' health check-ups and their knowledge level about pregnancy is presented (Table 2).

The most consumed foods according to consumption

Table 2. Health check-ups of the participants and knowledge level about pregnancy.

Variable	Group	n	f (%)
Month of starting health check-ups	1st month	27	6.0
	2nd month	302	67.3
	3rd month	94	20.9
	4th month	26	5.8
Frequency of health check-ups	Once a week	18	4.0
	Every fifteen days	57	12.7
	Once a month	295	65.7
	Less frequent	79	17.6
Status of obtaining information about pregnancy	Yes	92	20.5
	No	357	79.5
Source of information about pregnancy	Doctor	14	3.1
	Dietitian	18	4.0
	Nurse-midwife	37	8.2
	Relatives, newspapers, radio or television, etc.	23	5.1

scores were as follows: fresh fruits excluding citrus and dried fruits (78.8%), fresh vegetables excluding leafy greens and potatoes (78.5%), yogurt and cheese (71.1%) and bread (70.4%). The least consumed foods were as follows: ready-made vegetable juices (0.3%), ready-made fruit juices (2.4%) and turkey meat (6.6%). Additionally, it was observed that the egg consumption score of the participants was 69.8%.

Information regarding the frequency of food consumption during pregnancy among participants is presented (Table 3).

When evaluating the results of the analysis conducted to determine the nutritional knowledge levels, majority of the participants (97.3%) claimed that the foods consumed during pregnancy affect the health of the baby, 86.1% of the participants stated that those of normal weight should increase their food intake during pregnancy and 66.6% stated that a weight gain ranging 9-14 kg is necessary. The foods considered to be the most risky for consumption were identified as raw meat and dairy products. Overall, 360 (80.2%), 52 (11.6%) and 37 (8.2%) participants had a moderate level, inadequate level, and good levels of nutritional knowledge.

When evaluating the main findings of the analyses conducted on egg consumption, it was found that 82.2% of pregnant women consumed eggs. Moreover, the participants preferred standard natural eggs the most, with a preference rate of 21.6%. The most common time for egg consumption was during breakfast, with a preference rate of 66.8%. The reasons for consumption were reported as 37% for the nutritional value of eggs and 34.1% for being pregnant. During pregnancy, 48.1% of the participants increased their egg consumption, 14% decreased it and 20% had no change. The most commonly reported reason for not consuming eggs was 'disliking the smell'. Moreover, the participants predominantly consumed large-sized eggs (55.2%) and none preferred egg products,

such as liquid or dried eggs, and the preferred place of purchase was identified as supermarkets, with a preference rate of 52.8%. Quail eggs were identified as the most commonly preferred alternative to chicken eggs, with a preference rate of 21.8%. When evaluating the findings related to eggs consumption and cholesterol levels, 6.2% of the participants stated that 'eggs raise cholesterol levels in healthy individuals and should be consumed in moderation', 50.1% indicated that 'individuals with elevated cholesterol should limit their egg consumption, whereas normal individuals do not need to restrict their intake', and 14.5% expressed the belief that 'eggs do not raise cholesterol levels'. Although 84% of the participants indicated that the presence of double yolk in eggs was not a reason for their preference, 77.7% did not consider the brand important. Moreover, 92% of the participants were unaware of the meanings of the codes on the eggs available for sale and 90.9% did not know the classifications for egg quality. It was determined that a significant number of the participants expressed the opinion that eggs should be washed before consumption and stored in the refrigerator without washing until they are consumed. Additionally, 80% of the participants expressed the opinion that 'hygiene measures are not implemented in places where eggs and egg products are produced and sold'. In response to the question, 'What is the shelf life of eggs?' majority of the participants (62.8%) answered, '28 days from the date of laying'. Overall, 36.3%, 30.5% and 33.2% of the participants had inadequate, moderate and good knowledge about egg consumption, respectively.

The results of the analysis on the differences in egg consumption among pregnant women based on age, education level, social security status, number of family members, BMI and nutritional knowledge level are presented (Table 4).

As observed in Table 4, the effects of variables, such as age, educational status, number of family members and current

Food type	Consumption frequency																					
	Every day		2-3 times a day		Every other day		Once a week		2-3 times a week		Once every 15 days		Once a month		Once a year		Rarely		Never		CS	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Milk	56	12.5	-	-	14	3.1	82	18.3	79	17.6	88	19.6	39	8.7	-	-	37	8.2	54	12.0	49.4	
Yogurt	41	9.1	50	11.1	171	38.1	27	6	107	23.8	53	11.8	-	-	-	-	-	-	-	-	71.1	
Cheese	41	9.1	50	11.1	171	38.1	27	6	107	23.8	53	11.8	-	-	-	-	-	-	-	-	71.1	
Milk desserts	-	-	-	-	-	-	48	10.7	-	-	195	43.4	180	40.1	26	5.8	-	-	-	-	41.1	
Red meat	-	-	-	-	68	15.1	195	43.4	132	29.4	27	6	27	6	-	-	-	-	-	-	61.7	
Chicken meat	-	-	-	-	54	12	209	46.5	132	29.4	27	6	27	6	-	-	-	-	-	-	61.4	
Fish meat	-	-	-	-	-	-	14	3.1	92	20.5	129	28.7	-	-	83	18.5	86	19.2	45	10	27.0	
Turkey meat	-	-	-	-	-	-	-	-	-	-	-	-	18	4	36	8	142	31.6	253	56.3	6.6	
Offal	-	-	-	-	-	-	28	6.2	-	-	28	6.2	41	9.1	52	11.6	46	10.2	254	56.6	13.7	
Egg	59	13.1	-	-	110	24.5	136	30.3	126	28.1	18	4	-	-	-	-	-	-	-	-	69.8	
Sausage, salami, pastrami	-	-	-	-	-	-	28	6.2	-	-	28	6.2	41	9.1	52	11.6	46	10.2	254	56.6	13.7	
Legumes	-	-	-	-	-	-	123	27.4	41	9.1	204	45.4	81	18	-	-	-	-	-	-	49.5	
Bread	154	34.3	83	18.5	94	20.9	14	3.1	-	-	-	-	-	-	-	-	54	12	50	11.1	70.4	
Rice	-	-	-	-	-	-	124	27.6	102	22.7	120	26.7	-	-	37	8.2	52	11.6	14	3.1	46.0	
Bulgur	-	-	14	3.1	-	-	124	27.6	102	22.7	120	26.7	-	-	37	8.2	52	11.6	-	-	48.8	
Pasta	-	-	-	-	-	-	124	27.6	102	22.7	120	26.7	-	-	37	8.2	52	11.6	14	3.1	46.0	
Pastries																						
(cakes, cookies, pies, biscuit)	28	6.2	-	-	-	-	123	27.4	105	23.4	75	16.7	41	9.1	27	6	36	8	14	3.1	50.2	

Table 3. (Continued) Participants' frequency of food consumption during pregnancy.

Food type	Consumption frequency													
	Every day		2-3 times a day		Every other day		2-3 times a week		2-3 times a week		Once every 15 days		Once a month	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Green leafy vegetables	54	12	106	23.6	68	15.1	52	11.6	52	11.6	54	12	36	8
Fresh vegetables	117	26.1	9	2	134	29.8	163	36.3	26	5.8	-	-	-	-
Potato	-	-	-	-	59	13.1	174	38.8	75	16.7	105	23.4	36	8
Freshly squeezed vegetable juices	14	3.1	-	-	-	-	41	9.1	39	8.7	-	-	27	6
Ready-made vegetable juices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Citrus fruits	14	3.1	-	-	45	10	134	29.8	137	30.5	65	14.5	54	12
Fresh fruits	119	26.5	88	19.6	106	23.6	36	8	50	11.1	50	11.1	-	-
Dried fruits	52	11.6	53	11.8	67	14.9	95	21.2	45	10	27	6	-	-
Freshly squeezed fruit juices	14	3.1	-	-	36	8	89	19.8	45	10	-	-	-	-
Ready-made fruit juices	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Margarine (liquid, solid, semi-solid)	-	-	-	-	9	2	95	21.2	-	-	92	20.5	119	26.5
Butter	123	27.4	14	3.1	92	20.5	53	11.8	41	9.1	63	14	-	-

n: number of people, CS: Consumption Score

Table 4. Analysis of the differences in egg consumption among pregnant women based on age, education level, social security status, number of family members, BMI, and nutritional knowledge level.

Variable	Group	n	\bar{x}	SD	F	P
Age	18–25	176	18.41	10.718	5.726	0.004*
	26–35	201	19.60	10.312		
	36–45	72	23.19	7.841		
Educational status	Illiterate	9	10.00	.000	12.200	0.000*
	Literate	43	10.47	12.479		
	Primary education	142	21.80	10.112		
	High School	130	20.92	8.371		
	University	113	19.42	9.746		
Social security status	Postgraduate	12	25.00	7.385	35.106	0.000*
	Social Insurance Institution	254	19.04	9.108		
	Green Card	53	28.77	2.172		
	Private Insurance	26	27.50	2.550		
	Pension Fund	81	11.98	12.265		
Number of family members	No	35	23.00	8.062	14.472	0.000*
	2	204	16.99	11.452		
	3	148	21.72	9.326		
	4	77	24.29	6.108		
	5	20	15.00	5.130		
BMI (Current)	Normal	201	22.91	8.238	19.254	0.000*
	Overweight	153	17.19	11.193		
	Obese	95	17.00	10.604		
Nutrition knowledge level	Inadequate	52	1.46	0.670	24.187	0.000*
	Middle	360	1.97	0.834		
	Good.	37	2.65	0.484		

* $P < 0.05$. n: number of people, \bar{x} : arithmetic mean, SD: standard deviation, F: ANOVA test value, P: significance value.

BMI, among pregnant women with respect to egg consumption were significant. Similarly, egg consumption differed statistically significantly according to the level of knowledge ($P < 0.05$). From post-hoc analysis, it was determined that the mean scores of pregnant women with high nutritional knowledge levels were higher than those with medium and inadequate nutritional knowledge levels and the mean scores of pregnant women with medium nutritional knowledge levels were higher than those with inadequate nutritional knowledge levels.

Egg consumption among pregnant women did not differ statistically according to their employment status ($P > 0.05$). From the post-hoc analysis, it was found that the mean scores of egg consumption of participants with higher food consumption frequency were statistically significantly higher than those with lower food consumption frequency. From the correlation analysis, it was found that egg consumption among pregnant women was most affected by cereal group food consumption followed by meat products and fat and milk products. However, egg consumption was least affected by food consumption by the fruit and vegetable groups.

DISCUSSION

The mean age of the participants was 28.88 ± 5.99 years and all were in their reproductive phase, which is considered as physiologically healthy. In fact, according to the Turkey Demographic and Health Survey, the age group with the highest fertility rate is 25-29 years. Advanced maternal age is defined as being a mother over the age of 35 years, and, in recent years, the number of mothers with advanced maternal age has been increasing especially in developed countries (Lean et al., 2017). Frederiksen et al. (2018) stated that chromosomal abnormalities, preterm birth and miscarriage are more likely in pregnant women over 40 years of age. Adolescent pregnancies, defined by the World Health Organization as those between the ages of 10 and 19 years, are known to cause serious public health problems in the short and long term (Sen and Kavlak, 2011). Askari et al. (2020) suggested that the risk of birth complications is high in pregnant women during adolescence as physiological development is not fully completed during this period.

There is an increasing trend towards obesity from 9.1% to 21.2% in terms of BMI during pregnancy. Above average

pre-pregnancy weight and excessive weight gain during pregnancy leads to difficult and related complications during parturition. Thus, BMI assessment in the prenatal follow-up of pregnant women and regulation of weight gain is of great importance in terms of pregnancy and intrauterine health. Considering that 6% of the pregnant women in the study had previously experienced miscarriage, it can be suggested that obesity may create a predisposition for recurrent miscarriage cases. As a matter of fact, the relationship between obesity and recurrent miscarriages is a topic that has been addressed. Cavalcante et al. (2019), in a meta-analysis aiming to reveal the relationship between obesity and recurrent miscarriage, revealed that the rate of miscarriage is higher in pregnant women with obesity. Ku et al. (2015) conducted a study consisting of 119 pregnant women between the 6th and 10th gestational weeks who presented to obstetricians with a miscarriage case. Researchers found that 25.2% of pregnant women had early pregnancy loss. Early pregnancy loss is one of the most common complications of pregnancy and du Fossé et al. (2020) stated that 10%–15% of clinically confirmed pregnancies result in miscarriage.

Similar to the findings of our study, Ozkoc (2013) found that majority of pregnant women had never smoked (96.7%) and drank alcohol (83.3%). It is known that tobacco use among pregnant women in European countries is ~20% (Candel et al., 2015). It has been scientifically demonstrated that smoking during pregnancy has serious negative health effects on the pregnant women and the developing fetus (Miguez et al., 2017). Mardby et al. (2017) tried to determine the alcohol consumption habits and the effects of alcohol consumption in 7905 pregnant and in women postpartum. The researchers found that 15.8% of the participants consumed alcohol regularly and 39% consumed alcohol once a month. The highest consumption by country was reported to be in the UK (28.5%), Russia (26.5%), Switzerland (20.9%), Poland (9.7%), Sweden (7.2%) and Norway (4.1%). Moreover, they suggested that higher education level and smoking were predictors of alcohol consumption during pregnancy. Similarly, Lanting et al. (2015) found that maternal age of mother, cigarette consumption and higher education level had a parallel relationship with alcohol consumption.

In the light of the data obtained in our study, it was determined that 24.9% of the participants had at least one illness during pregnancy, such as diabetes, hypertension, anemia, thyroid diseases, kidney diseases and bone and joint diseases according to the frequency of occurrence. When the pre-pregnancy disease history (18.7%) is considered, thyroid diseases, diabetes, liver diseases, gallbladder diseases, anemia, hypertension and kidney diseases were the most frequently reported diseases. The fact that pregnant women have a known chronic disease before pregnancy is important for the health of the mother and newborn. Chronic diseases may also be associated with the dietary characteristics and BMI of the pregnant mother. Gumus et al. (2010) found that the rates of gestational diabetes and hypertension were statistically significantly higher in individuals who were obese before pregnancy.

It was found that a significant proportion of pregnant

women who participated in the study did not receive any information on nutrition during pregnancy and that the majority of those who received information received information from nurses-midwives. Aktac et al. (2018) aimed to evaluate the nutritional knowledge of pregnant women according to their sociodemographic characteristics. They found that 50.9% of the participants received nutrition information. Additionally, they identified the sources of information as doctors, nurses, internet, newspapers, magazines, television, and radio. Similar to the findings of the study, the researchers stated that the number of participants who consulted a dietitian for information on nutrition was low. Bryant et al. (2019) reported that 63% of women who applied to antenatal clinic in Australia received information on nutrition. Since adequate and balanced nutrition during pregnancy has a great impact on the psychological and physiological needs of pregnant woman before and after giving birth as well as on the mental and physical development of the fetus, it is important for pregnant women to receive information on nutrition during pregnancy. As a matter of fact, Blondin and LoGiudice (2018), in their study on increasing the nutritional knowledge level of pregnant women, provided nutrition education during the study. It has been reported that nutritional scores increased statistically significantly after training practices.

In the evaluations based on consumption scores, it is noteworthy that fresh fruits (fruits other than citrus fruits and dried fruits) and fresh vegetables (vegetables other than green leafy vegetables and potatoes) are the most consumed foods and the relatively high scores obtained for egg consumption are the main findings. It is known that the daily food consumption amounts required during pregnancy period should be 400-600 ml of milk and yogurt, 60 g of cheese, 3-4 portions (~100 g) of meat, chicken and fish, 1 portion of eggs and legumes, 5-6 portions of fresh vegetables and fruits, 6-10 slices of bread and none or 2-3 portions of rice, bulgur, pasta, etc. (Dibek, 2007). Nogay (2011) aimed to evaluate the nutritional status of pregnant participants aged 18-42 years. The researcher found that pregnant women did not change the amount of food consumption during the gestation period and the foods that they increased the most were fruit (47.1%) and milk and yogurt (42.9%). Pregnant women stated that citrus fruits (30.0%) were the food they most desired and chicken meat (22.9%) was the food they not prefer the least. Goksin Cihan et al. (2012) tried to reveal the level of knowledge among pregnant women about healthy pregnancy and nutrition. Pregnant women who participated in the study reported that the foods that should definitely be consuming during this period were milk and yogurt (75.2%), vegetables and fruits (57.4%) and meat and eggs (54.0%).

In the study, 77.5% of the participants stated that consumption of non-heat-treated meat and dairy products is risky during pregnancy. Contrary to the findings, Bryant et al. (2019) suggested that one-third of pregnant women were unaware of the foods that should be avoided during pregnancy. Considering that raw meat and its products are among the main foods responsible for toxoplasmosis, the tendency of the participants in this direction is thought to be conscious. Bienkowski et al. (2022) found a statistically significant relationship between raw

meat consumption parameters and *Toxoplasma gondii* seropositivity in pregnant women.

It can be stated that egg consumption of pregnant women differed statistically significantly according to age ($P < 0.05$) and egg consumption of the participants increased with age. However, it is observed that egg consumption differed statistically significantly according to educational status ($P < 0.05$) and the mean scores of egg consumption increased with the increase in educational level in all groups. According to the social security status of the participants, egg consumption differed statistically significantly ($P < 0.05$) and as a result of the post-hoc analysis, it was determined that those who were members of the Retirement Fund had the lowest average, followed by Social Insurance Institution and those without social security. Moreover, it has observed that the number of individuals in the family has an effect on egg consumption, which was statistically significantly ($P < 0.05$). It was determined that those who had 4 members in their families had a statistically significantly higher mean than those who had 2-5 members. When the effect of the participants' BMI on egg consumption was evaluated, egg consumption differed statistically significantly according to BMI. Post-hoc analysis shows that those with normal BMI have higher mean scores on egg consumption than those who are overweight and obese. Additionally, those who are obese had the lowest mean score. It is important to note that a significant proportion of pregnant women (360 participants) had a moderate level of knowledge about nutrition during pregnancy and their egg consumption increases with the increase in their level of nutritional knowledge. Dibek (2007) found that 46.9%, 36.2%, 15.8% and 1.1% of pregnant women had very good, good, fair and poor nutritional knowledge, respectively.

It is important to note that pregnant women reported consuming eggs at a considerable level, 87.8% of the participants reported consuming eggs during pregnancy. Schnefke et al. (2019) stated that 50% of pregnant women in Kenya consumed eggs during pregnancy. Christian et al. (2006) reported that egg consumption during pregnancy is low in Nepal, resulting from religious reasons. Similarly, Hong et al. (2016) found that a small proportion of participants (5.0%) did not consume eggs during pregnancy in Zambia and suggested that religious beliefs were the main reason for not consuming eggs. Jardi et al. (2019) determined that the amount of egg consumed by pregnant women during pregnancy was not at the recommended level. Although the annual egg consumption per capita in our country is slightly above the global average, it remains well below the levels in developed countries (Mizrak et al., 2012). Therefore, eggs should be an important part of the diets of all consumer groups, especially pregnant women, because of their high nutritional value and easy availability.

In terms of the preferred egg types, it is seen that there is a ranking from most to least; standard natural eggs, organic eggs, village eggs and free-range chicken eggs. It was observed that a significant proportion of the participants (92.0%) did not know what the codes on egg stamps meant. Although it is known that cage-free eggs are the most consumed egg type globally, it is stated that the market for free-range and organic

eggs is growing rapidly because of factors, such as increasing income and education levels. Derebasi (2019) aimed to examine egg consumption awareness and consumer behaviours. Similarly, the researcher found that 63.5% of the respondents consumed eggs primarily for breakfast, 45.0% of them bought eggs from the market, and 52.22% of them bought medium size eggs. The high quality protein contained in eggs contributes to the protein requirements of the body. Moreover, eggs are considered an ideal food recommended to be consumed during pregnancy as they have a high essential amino acid content. However, eggs are an important source of essential fatty acids. Egg consumption is reported to increase the positive evidence for maternal and intrauterine nutrition during pregnancy (Iannotti, 2017). In this context, it is noteworthy that 48.1% of the participants' egg consumption increased during pregnancy. Wallace and Fulgoni (2017) reported that adults who consume eggs have a higher healthy eating index than those who do not. However, they noted that adults who consumed eggs had approximately twice the choline intake compared to those who did not.

Mizrak et al. (2012) stated the reasons for not consuming eggs in Turkey as health problems (54.50%), dislike of eggs (31.80%) and high price of eggs (13.70%). Hillier and Olander (2017) systematically reviewed 898 scientific studies to determine the nutritional changes in women before and during pregnancy. In the light of the findings obtained, it was determined that the amount of eggs consumed by women before pregnancy was 22.2 g and the amount consumed during pregnancy was 11.1 g.

It is thought that all of the pregnant women who participated in the study reported that they did not consume egg products should be taken into consideration. The amount of eggs allocated for egg products in Turkey is 2.77% of the total amount of eggs produced. As egg products can be used as an alternative source for people who cannot consume eggs, it is thought that developing and expanding the use of egg products will increase egg consumption. Indeed, it is known that egg products such as frozen, dried and pasteurised liquid eggs have a large consumption volume, especially in developed countries. For example, it is reported that ~25% of total egg production in the USA is used in the production of egg products (Dogruer et al., 2015).

It was found that about half of the pregnant women who participated in the study stated that 'individuals with elevated cholesterol should consume eggs in a limited way, normal individuals do not need to consume eggs in a limited way' in relation to eggs and cholesterol. Derebasi (2019) tried to determine the knowledge of consumers about the relationship between eggs and cholesterol and reported that 47.80% of the participants reported that eggs had no effect on blood cholesterol levels. The researcher stated that the consumer perception that eggs contain high levels of cholesterol and cause cardiovascular diseases by increasing blood cholesterol levels is the main reason why egg consumption amounts have not reached the desired levels. The relationship between dietary cholesterol and atherosclerotic cardiovascular disease remains controversial. Scientific efforts are ongoing to elucidate the

effects of dietary cholesterol on serum cholesterol concentrations and cardiovascular disease. Shin et al. (2013) investigated the effect of egg consumption on cardiovascular diseases and suggested that there was no significant relationship between egg consumption and cardiovascular diseases. Rosenson and Wen-Liang (2019) reported that egg consumption may alter the atherogenicity of triglyceride-rich lipoproteins such as low-density lipoprotein and that guidance on egg consumption should continue in dietary guidelines and recommendations.

There is a tendency that the places where eggs and egg products are produced and sold do not comply with hygienic standards. Similarly, Derebasi (2019) reported that 56.99% of consumers did not find the inspections in egg production sufficient. Mizrak et al. (2012) stated that 67.11% of consumers think that egg production facilities are not sufficiently inspected.

Through the ~10,000 pores in the eggshell, microorganisms can contaminate the interior of the egg and create microbial contamination. This can lead to numerous infections caused by pathogens and public health problems. Coronel-Reyes et al. (2018) reported that the maximum storage period of eggs at room temperature should be 14 days. Kosa et al. (2015) aimed to reveal the egg consumption behaviours of consumers and found that 61.8% of the participants checked the expiry dates before purchasing eggs. The Turkish Food Codex Communiqué on Eggs and Egg Products states that the expiry date of Class A eggs cannot be more than 28 days after the laying date.

It was determined that 36.3% of the pregnant women participating in the study had inadequate, 30.5% moderate and 33.2% good level of knowledge about egg consumption. Lutter et al. (2021) suggested that egg consumption should increase to reduce neonatal mortality. The researchers stated that trainings to increase the level of nutritional knowledge of pregnant women could be an effective strategy. Mizrak et al. (2012) conducted a study with 2241 families to determine egg consumption and consumer habits in Turkey and found that 24.67% of the participants were aware of the nutritional value of eggs. In addition, they argued that for a healthy society, consumers should be made aware of the nutritional value of eggs through effective promotions.

When the egg consumption of pregnant women according to their educational status was analysed, it was determined that the egg consumption of the participants differed statistically significantly. It is observed that as the education level of pregnant women increases, their egg consumption also increases. Similarly, Sari et al. (2015) tried to determine the level of knowledge of pregnant women about nutrition during pregnancy. The researchers found that the level of nutritional knowledge of pregnant women with high school education and above was higher.

CONCLUSION

It is thought that it is important to increase the nutritional knowledge levels of pregnant women by preparing educational programmes. Pregnant women should be directed to nutritionists in health institutions where they go for regular follow-up

during pregnancy and they should be helped to access the right information. Pregnant women should be made aware of the benefits of egg consumption during pregnancy and activities should be organised to increase egg consumption. Pregnant women who cannot consume eggs for some reason should be encouraged to consume egg products.

DECLARATIONS

Ethics Approval

Selçuk University Faculty of Veterinary Medicine Experimental Animal Production and Research Center Ethics Committee (SUVDAMEK)

Written informed consent to participate and publish was obtained from all individual participants included in the study.

Meeting date: 14.11.2019; Meeting number: 2019/13; Decision number: 2019/91

Conflict of Interest

The authors declare that they have no conflict of interest.

Consent for Publication

We hereby provide consent for the publication of the manuscript detailed above. We confirm that this information will be freely available online, and accessible.

Author contribution

Idea, concept and design: NT, SK

Data collection and analysis: SK

Drafting of the manuscript: NT, SK

Critical review: NT

Data Availability

The data is available from the corresponding author on reasonable request.

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