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Original Article

Baseline data of a prospective cohort study: Cappadocia cohort study, Turkey

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Abstract

Aims: This study aimed to determine the prevalence of chronic diseases and behavioural risk factors from the baseline data of a large prospective cohort study initiated in the Cappadocia region of Turkey. **Method:** The study population consisted of adult volunteers who resided in two towns, Gulsehir and Avanos, of the Cappadocia region. For the planned community-based intervention trials, Gulsehir served as the "intervention" town and Avanos was the "control" town. The study was initiated in 2013 and was planned to be continued for a minimum of 10 years. Study offices were established in both towns and trained personnel conducted electronic

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questionnaires and physical examinations by visiting households and working places. **Results:** In total, 10,992 individuals were enrolled. Compared to Turkey's adult population, the mean age (44.5±17.4 years vs. 31.9±21.2 years) and the female proportion (56.5% vs. 51.2%) were higher but the proportion of university graduates (17.1% vs. 32.2%) was lower in the study cohort. The rates of females having obesity (39.0% vs. 20.8%) and high-risk waist circumference (61.8% vs. 30.7%) were higher than males. Obesity was also a very prevalent risk factor among females in both towns (36.9% in Avanos and 41.5% in Gulsehir). Physical activity levels were low; only 6% of females and 8% of males were "active" or "very active" even at the youngest age group (18-34 years). The rate of smoking was higher in males than in females (46.9% vs. 13.8%). The prevalence of hypertension, diabetes mellitus, and rheumatologic diseases were higher in females than in males ($p<0.0001$ for each); however, no significant differences were obtained for cardiovascular diseases and chronic obstructive pulmonary disease. In both towns, hypertension was the most commonly reported chronic disease followed by DM, hyperlipidaemia, and cardiovascular diseases. **Conclusions:** Baseline data revealed a high prevalence of modifiable lifestyle risk factors in the Cappadocia region of Turkey and elucidated the need for effective community-based interventions.

Key words: Cohort studies, intervention study, chronic diseases, risk factors

Bir prospektif kohort çalışmasının temel verileri: Kapadokya kohort çalışması, Türkiye

Öz

Amaç: Bu çalışmada, Türkiye'nin Kapadokya bölgesinde başlatılan geniş bir prospektif kohort çalışmasının temel verilerinden kronik hastalıkların ve davranışsal risk faktörlerinin prevalansını belirlemek amaçlanmıştır. **Yöntem:** Çalışma popülasyonu Kapadokya bölgesinin iki ilçesi Gülşehir ve Avanos'ta ikamet eden yetişkin gönüllülerden oluşuyordu. Toplum temelli olarak planlanan bu müdahale çalışmasında Gülşehir "müdahale", Avanos "kontrol" ilçesi olarak seçildi. Çalışma 2013 yılında başlatıldı ve en az 10 yıl devam etmesi planlandı. Her iki ilçede de çalışma ofisleri kuruldu ve eğitimli personeller tarafından ev ve iş yeri ziyaretleri ile elektronik anketler uygulandı ve fizik muayeneler yapıldı. **Bulgular:** Toplamda 10.992 kişi kaydedilddahil edildi. Türkiye'nin erişkin nüfusu ile karşılaştırıldığında, çalışma kohortunda yaş ortalaması (44.5±17.4 yıla karşılık 31.9±21.2 yıl) ve kadın oranı (%56.5'e karşılık %51.2) daha yüksekti ancak üniversite mezunlarının oranı (%17.1'e karşılık %32.2) daha düşüktü. Kadınlarda erkeklere kıyasla obezite (%39.0'a karşılık %20.8) ve yüksek riskli bel çevresi (%16.8'e karşılık %30.7) oranı daha yüksekti. Obezite ayrıca her iki ilçede de kadınlar arasında çok yaygın bir risk faktörüydü (Avanos'ta %36.9 ve Gülşehir'de %41.5). Fiziksel aktivite seviyeleri düşüktü; en genç yaş grubunda bile (18-34 yaş) sadece kadınların %6'sı ve erkeklerin %8'i "aktif" veya "çok aktif" idi. Sigara içme oranı erkeklerde kadınlara göre daha yüksekti (%46.9 karşılık %13.8). Hipertansiyon, diabetes mellitus ve romatolojik hastalıkların prevalansı kadınlarda erkeklere göre daha yüksekti (her biri için $p <0.0001$); ancak kardiyovasküler hastalıklar ve kronik obstrüktif akciğer hastalığı için anlamlı fark saptanmadı. Her iki ilçede de hipertansiyon en sık bildirilen kronik hastalık iken, bunu Diabetes Mellitus, hiperlipidemi ve kardiyovasküler hastalıklar izliyordu. **Sonuçlar:** Başlangıç veriler, Türkiye'nin Kapadokya bölgesinde modifiye edilebilir yaşam tarzı risk faktörlerinin yüksek prevalansını göstermiş ve etkili toplum tabanlı müdahalelere duyulan ihtiyacı ortaya çıkarmıştır.

Anahtar kelimeler: Kohort çalışmaları, müdahale çalışması, kronik hastalıklar, risk faktörleri

Introduction

Chronic, non-communicable diseases, including cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes mellitus (DM), have become a leading cause of mortality worldwide, especially in low- and middle-income countries.[1] The World Health Organization has also reported that nearly 75% of all deaths are caused by chronic diseases in low- and middle-income countries.[1] Furthermore, the 2013 Global Burden of Disease (GBD) study showed that, communicable causes of mortality significantly decreased since 1990 in the most low- and middle-income countries; however, chronic diseases such as ischemic heart disease (IHD), stroke, and DM become the main causes of mortality.[2] This is significant because those who experience the greatest burden of disease are also among those who are the least able to afford medical attention and lifestyle changes which are necessary to control, reduce, and prevent disease.

Turkey is an upper-middle-income country with a population of 77.7 million.[3] In Turkey, 22.5 million individuals had hypertension and cardiovascular morbidity and mortality remained high.[4] In 2007, IHD, the leading cause of mortality, accounted for 22% of all deaths in Turkey.[5, 6] TURDEP-II survey found the prevalence of DM, obesity, and hypertension to be 16.5%, 36.0%, and 31.4%, respectively.[7] High salt consumption is common in Turkey, where the average amount of salt intake per day is 18 grams.[8] Smoking and physical inactivity are also high; the Global Adult Tobacco Survey of Turkey Report indicated that approximately 16 million adults were current smokers.[9] Another study suggested that high smoking rates in Turkey led to early acute myocardial infarction as compared with other European countries.[10]

The Ministry of Health of the Republic of Turkey implemented the Health Transformation Program in 2003 in order to improve healthcare and delivery across the country. In this program, a family practitioner scheme was introduced.[11] However, this reform has still some shortcomings in the management and prevention of chronic diseases.[12] According to the 2013 GBD study, the first ten causes of years of life lost were IHD, lower respiratory infections, stroke, diarrhoea, road injury, HIV/AIDS, preterm birth, malaria, neonatal encephalopathy, and congenital causes worldwide.[2] In Turkey, the greatest burden of disease in terms of years of life lost in adults was due to IHD, stroke, lung cancer, chronic obstructive pulmonary disease (COPD), DM, and road injuries; all preventable causes of death.[2] Low- and middle-income countries need less costly but more efficient solutions for prevention of chronic diseases. Community-based intervention trials are crucial in identifying cost-effective strategies to prevent chronic diseases,[13] which are also urgently needed for Turkey. Previous community-based intervention trials have shown great success mostly in the Western countries, such as the North Karelia Project in Finland and programs in Minnesota, Stanford, and Rhode Island in USA.[14-20] There are few community intervention trials conducted in low- and middle-income countries.[13,21] This paper presents the purpose, design, and baseline data of a large prospective cohort study initiated in Cappadocia region of Turkey. The aim of the present study was to determine the prevalence of chronic diseases and behavioural risk factors, and to establish a study base for future community-based interventions.

Material-Methods

Study Design and Selection of Study Population

The present study was designed as a prospective cohort study including interventional components. The observational part of the study was initiated in March 2013 and included two towns in Turkey, Avanos and Gulsehir, both in the Cappadocia region. These towns were selected due to their low migration rates and geographically proximity to the capital city, Ankara province, wherein the central offices of the Turkish Society of Internal Medicine are located. Both Avanos and Gulsehir had a five-year migration rate less

than 10%[22], which allowed for efficient and accurate follow-up. Another contributing factor for selecting these two towns was the fact that despite their proximity to Ankara province, they did not have major economic or social interdependency, which would otherwise have caused a higher spillover effect of the interventions. Gulsehir's economy is driven by agriculture while the economy of Avanos mostly depends on tourism. For the interventional part of the present study, Gulsehir was chosen to serve as the intervention-receiving town where community-level health interventions were implemented and Avanos was chosen to be the control town. The first population level intervention study aimed to lower salt consumption and was planned to start in September 2016.

Study Procedures

After obtaining the approval from the Ethics Committee of Hacettepe University (date: December 2012 and No: FON 12/25-04), study offices were set up at the centres of the towns. All individuals who were ≥ 18 years old at the start date of the study and were residents in one of the study towns for at least one year and planned to live there for the next 12 months or longer were invited to participate in the study. Individuals who were not capable of providing consent due to a mental disorder were excluded from the study.

Study personnel were comprised of local nurses and health-care workers, who were trained on the study and involved procedures. The study was advertised and promoted through multiple local channels, including local media channels, municipal administration, family health-care centres, religious services workers, and a public website (www.kapadokyaprojesi.org).

The trained personnel visited households and several working places including government offices, factories, and schools to inform the public about the purpose, goals, and forthcoming procedures of the study. Up to 10 household or working place visits were performed so as to include as many people as possible and prevent selection bias.

Data collection

Once informed, written consent was obtained and participants were administered an electronic questionnaire of 167 questions to gather baseline data. Study personnel collected the following information: demographic characteristics, place of residence, level of education, employment status, lifestyle information, and medical history including diagnosed illnesses and medication use. Participants also had a physical examination including the measurement of blood pressure, body weight, height, and waist and neck circumferences. For blood pressure measurements, standard upper arm sphygmomanometers were used. After resting for 5 minutes in a sitting position, a minimum of two consecutive measurements were performed at least 2-minutes intervals and the average of the two measurements was recorded.

Smoking statuses of the participants were defined as *never smoker*, *former smoker*, and *current smoker*. Current smokers were defined as individuals who have smoked at least 100 cigarettes in their lifetime and who currently smoke every day or on some days. Former smokers were defined as individuals who have smoked at least 100 cigarettes in his or her lifetime but who had quit smoking for at least the last 6 months. Never smokers were defined as individuals who have never smoked or who have smoked less than 100 cigarettes in their lifetime.[23] Since alcohol use per capita is very low in Turkey, we defined alcohol use in our study as the report of at least one drink per month.

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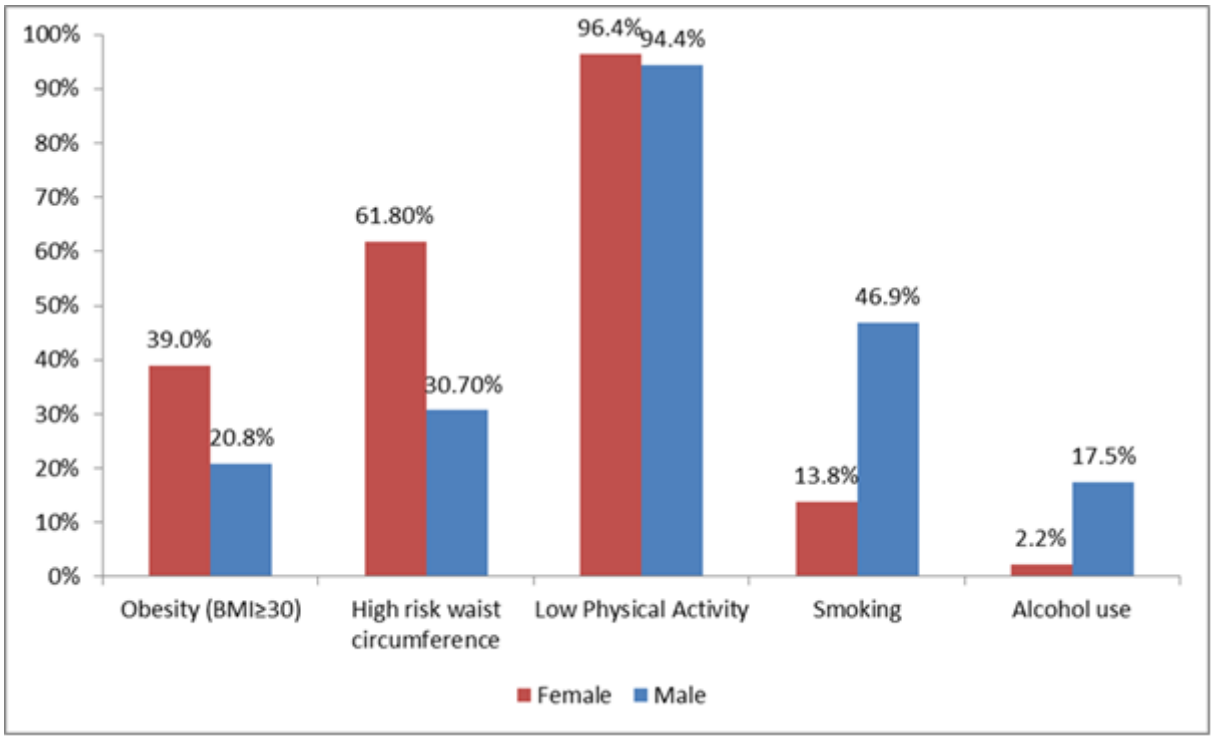

Figure 1. Behavioural risk factors according to gender in the study cohort. Smoking shows only current smokers, alcohol use shows more than 1 drink per month, and low physical activity shows very light, light, and moderate activity levels combined.

Individuals whose body mass index (BMI) was >30 kg/m^2 was defined as obese. High-risk waist circumference was defined as a waist circumference of >102 cm in males and >88 cm in females.[24]

For studying physical activity levels, a short questionnaire, shown to be a very good predictor of Energy Expenditure, was used.[25] This method involves scoring activity levels both at work and leisure to obtain a final score. Activity levels were classified as *very light*, *light*, *moderate*, *active*, and *very active*.

Study participants were planned to be surveyed every year regarding changes in the aforementioned factors, development of new illnesses, changes in weight and waist size, medication use, level of physical activity, smoking, alcohol consumption, and nutritional factors. Information regarding death and causes of death were also planned to be collected via "cause of death" forms contained in municipality offices.

To guide the design of future studies and assist with the interpretation of findings from this cohort, we estimated the baseline prevalence for both illness and risk factors stratified by study towns and gender. To provide insight into the study population's similarities and differences with Turkey's general population, we presented data from the Turkish Statistical Institute (TurkStat)[26] and the 2013 Turkey Demographic and Health Survey (TDHS-2013).[27] Some data were provided by the TurkStat upon the official request of authors and were made available solely for this project.

Table 1. Selected characteristics of adults living in Avanos and Gulsehir in Cappadocia region and characteristics of adults of the general population and adults living in urban areas of Turkey

	Avanos N=5842	**Gulsehir N=5150**	**Cohort Total N=10992**	**p**	**Adults in general population of Turkey[26] N=53944 283**	**Adults in urban areas of Turkey[26] N=32391**
Age, year, mean±SD	45.5±17.7	43.4±17.0	44.5±17.4	<0.001*	31.9±21.2	31.1±20.4
Age categories, n (%)						
18-34 years	1876 (32.1)	1867 (36.3)	3743 (34.1)		10824 (38.0)	9024 (40.4)
35-49 years	1615 (27.6)	1402 (27.2)	3017 (27.4)		8156 (28.6)	6544 (29.3)
50-64 years	1382 (23.7)	1257 (24.4)	2639 (24.0)	<0.001**	6206 (21.8)	4629 (20.7)
+65 years	969 (16.6)	624 (12.1)	1593 (14.5)		3289 (11.5)	2125 (9.5)
Gender, n (%)						
Females	3355 (57.4)	2853 (55.4)	6208 (56.5)	**0.032****	14585 (51.2)	11325 (50.7)
Males	2487 (42.6)	2297 (44.6)	4784 (43.5)		13908 (48.8)	11004 (49.3)
Education attainment, n (%)						
No schooling	563 (9.6)	463 (9)	1026 (9.3)		4934 (17.3)	3043 (13.6)
Primary school	2906 (49.8)	2759 (53.6)	5665 (51.6)		10313 (36.2)	7577 (33.9)
High School	1362 (23.3)	1051 (20.4)	2413 (22.0)	**<0.001****	4001 (14.0)	3289 (14.7)
University	1004 (17.2)	877 (17)	1881 (17.1)		9163 (32.2)	8365 (37.5)
Health insurance, n (%)	5547 (95.0)	4899 (95.1)	10446 (95.0)	0.640**	8029 (91.5)	6634 (92.9)

SD, Standard deviation, *Mann-Whitney U test; **Chi-square test

Table 2. Selected household characteristics of adults living in Avanos and Gulsehir in Cappadocia region, adults of the general population, and adults living in urban areas of Turkey

	Avanos N=3080	**Gulsehir N=2375**	**Cohort Total N=5455**	**p**	**Adults in general population of Turkey[26] N=20625**	**Adults in urban areas of Turkey[26] N=14429**
Mean size of household, n	3.1	3.2	3.1	0.050*	3.6	3.6
Mean number of adults, n	2.4	2.3	2.4	0.026*	2.7	2.7
Income sufficiency, n (%)						
≤Minimum wage[28]***	987 (32.1)	1058 (45.0)	2045 (37.7)	<0.001**	3085 (15)	1371 (9.5)
>Minimum wage[28]***	2085 (67.9)	1291 (55.0)	3376 (62.3)		17541 (85)	13058 (90.5)
House ownership, n (%)						
Renting	962 (31.9)	865 (36.7)	1827 (34.0)	<0.001**	3181 (27.0)	3016 (32.3)
Owner	2055 (68.1)	1490 (63.3)	3545 (66.0)		6991 (59.3)	5069 (54.4)
Internet in the house, n (%)	1256 (40.8)	900 (38.0)	2156 (39.6)	0.039**	4393 (37.3)	4053 (43.5)
Computer in the house, n (%)	1521 (49.4)	1058 (44.7)	2579 (47.4)	0.001**	5780 (49.0)	5234 (56.2)

*Mann-Whitney U test; **Chi-square test; *** In accordance with the Minimum Wage Determination Commission decision, the gross amount of the minimum wage was 978.75 Turkish Liras for the first six months of 2013 and 1,021.50 Turkish Liras for the second six months of 2013.

Analysis and Sample Size

The sample size of 10,992 was sufficient to achieve a 95% confidence interval with a precision of 0.4-0.85%. Prevalence rates of chronic diseases and behavioural risk factors were presented. For categorical variables, a chi-square test was used in two group comparisons when the chi-square condition was met. When comparing two independent groups, the Mann-Whitney U test was used for non-normally distributed numerical variables. Relative risks were estimated among genders in terms of behavioural risk factors and disease prevalence within the stratum of each town. A Wald chi-square test was used for testing the homogeneity of relative risks between the towns and a Cochran Mantel-Haenszel test was used to evaluate the association beyond chance between gender and risk factors. The probability of a type I error was set at 0.05.

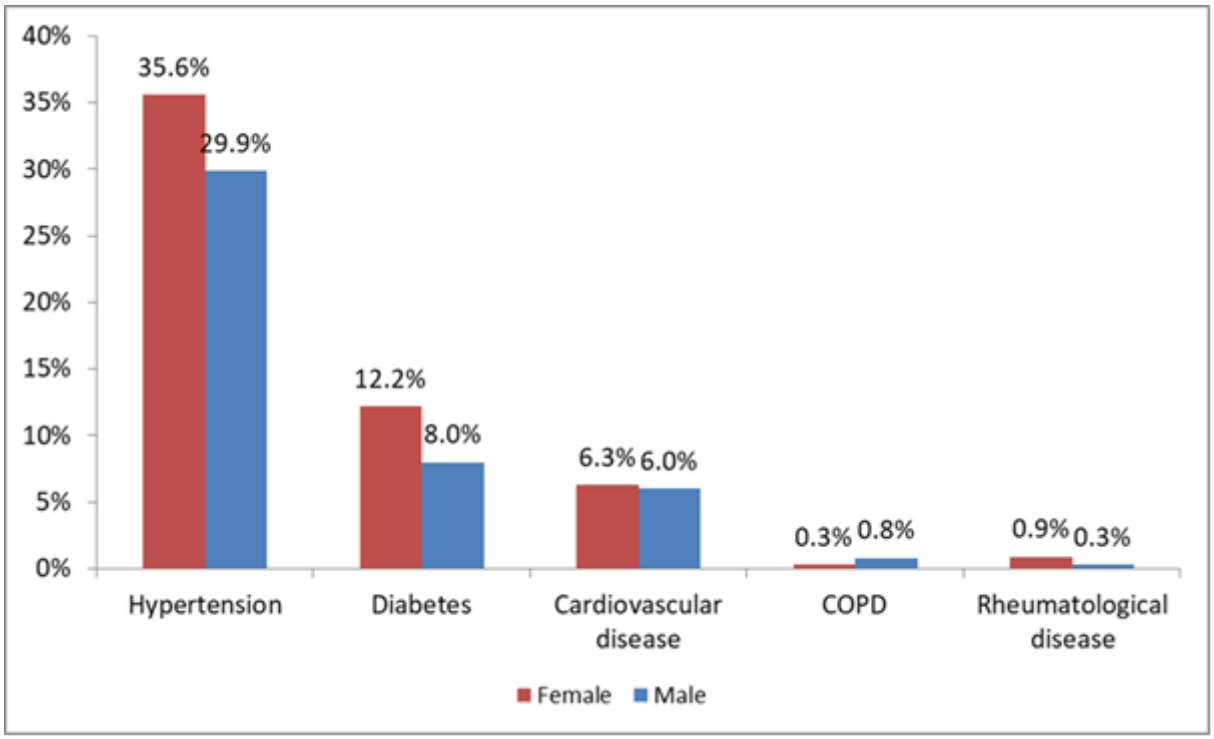

Figure 2. Prevalence of self-reported chronic diseases according to gender in the study cohort. Rheumatologic diseases include rheumatoid arthritis, ankylosing spondylitis, osteoarthritis, Behçet's disease, and familial Mediterranean fever.

Results

A total of 5455 households were visited and 11899 individuals were initially interviewed; 91% of those surveyed in Avanos and 94% of those surveyed in Gulsehir agreed to participate in the study. Only 928 individuals (7.8%) refused to participate. Baseline demographic and socioeconomic characteristics of the individuals in the study towns are presented in Table 1. For contrast and comparison, we presented the same characteristics of the adult population (>18 years old) in Turkey and also adults living in urban areas, since the study population consisted of only adults and excluded rural areas. There were significant differences between the study towns regarding age, age distribution, gender distribution, and education level ($p<0.001$, $p<0.001$, $p=0.032$, $p<0.001$, respectively). However, when compared to Turkey's adult population, in the study cohort, the mean age (44.5±17.4 years vs. 31.9±21.2 years) and the female gender proportion (56.5% vs. 51.2%) were higher but the proportion of university graduates (17.1% vs. 32.2%) was lower. These contrasts were more significant when data was limited to adults who lived in urban areas (Table 1). The mean household size in the study cohort was 3.1 individuals (Table 2); this was similar in both towns and comparable to national data. The rate of individuals earning less than or equal to the minimum wage per month in the study cohort was higher than the general population (37.7% vs. 15%, respectively). In comparison with the general population, the rate of house owners was slightly higher in the study cohort (66.0% vs. 59.3%) and the presence of internet (39.6% vs. 37.3%) and computers (47.4% vs. 49.0%) in the house was similar. Figure 1 shows the major behavioural risk factors for non-communicable diseases in the study cohort stratified by gender.

Table 3. Behavioural risk factors stratified by gender and town

	Avanos N=3080	**Gulsehir N=2375**	**Cohort Total N=5455**	**p**	**Adults in general population of Turkey[26] N=20625**	**Adults in urban areas of Turkey[26] N=14429**
Mean size of household, n	3.1	3.2	3.1	0.050*	3.6	3.6
Mean number of adults, n	2.4	2.3	2.4	0.026*	2.7	2.7
Income sufficiency, n (%)						
≤Minimum wage[28]***	987 (32.1)	1058 (45.0)	2045 (37.7)	<0.001**	3085 (15)	1371 (9.5)
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Internet in the house, n (%)	1256 (40.8)	900 (38.0)	2156 (39.6)	0.039**	4393 (37.3)	4053 (43.5)
Computer in the house, n (%)	1521 (49.4)	1058 (44.7)	2579 (47.4)	0.001**	5780 (49.0)	5234 (56.2)

*Mann-Whitney U test; **Chi-square test; *** In accordance with the Minimum Wage Determination Commission decision, the gross amount of the minimum wage was 978.75 Turkish Liras for the first six months of 2013 and 1,021.50 Turkish Liras for the second six months of 2013.

The rates of females having obesity (39.0% vs. 20.8%) and high-risk waist circumference (61.8% vs. 30.7%) were higher than males. Obesity prevalence was 13% within the 20-34 year age group but increased strikingly to 63% after 50 years of age (p<0.0001) and the prevalence of high-risk waist circumference increased from 30% to 86% between the same age groups (p<0.0001). Physical activity levels were low; only 6% of females and 8% of males were "active" or "very active" even at the youngest age group (18-34 years).The rate of smoking was higher in males; approximately half (46.9%) of the males were regular smokers, which was 3.4 times higher than females (13.8%). The rate of alcohol use was also higher in males; 17.5% of males had regular alcohol consumption, which was 8 times higher than females (2.2%). On the other hand, in the general population, the proportion of regular alcohol consumption was very low for both females and males. Age to start smoking was low among males; smoking prevalence was already above 50% both in the 20-34 year and 35-50 year age groups (58% and 57%, respectively) and dropped to 37% after the age of 50 years. The prevalence of hypertension, DM, and rheumatologic diseases were significantly higher in females than in males (p<0.0001 for each); however, no significant differences were obtained for cardiovascular diseases and COPD (Figure 2).

Table 4. Prevalence proportions of chronic diseases stratified by gender and town

Diagnosis	Avanos			Gulsehir				
	Females n (%) N=3355	Males n (%) N=2487	RR_{gender}* (CI %95)	Females n (%) N=2853	Males n (%) N=2297	RR_{gender}* (CI %95)	MH-RR** (CI %95)	p-value for homogeneity
Any chronic disease	1998 (59.6)	922 (37.1)	1.61 (1.52-1.70)	1597 (56.0)	841 (36.6)	1.53 (1.44-1.63)	1.57 (1.50-1.64)	0.11
Hypertension	1225 (36.5)	718 (31.9)	1.14 (1.06-1.23)	986 (34.6)	631 (27.9)	1.24 (1.14-1.35)	1.19 (1.12-1.26)	0.21
Diabetes mellitus	395 (11.8)	196 (7.9)	1.50 (1.27-1.76)	365 (12.8)	188 (8.2)	1.56 (1.32-1.85)	1.53 (1.36-1.72)	0.68
Hyperlipidaemia	259 (7.7)	83 (3.3)	2.31 (1.82-2.95)	207 (7.3)	71 (3.1)	2.35 (1.80-3.06)	2.33 (1.95-2.78)	0.95
Cardiovascular disease	204 (6.1)	131 (5.3)	1.15 (0.93-1.43)	186 (6.5)	156 (6.8)	0.96 (0.78-1.18)	1.05 (0.91-1.22)	0.22
COPD	5 (0.1)	12 (0.5)	0.31 (0.11-0.88)	5 (0.2)	7 (0.3)	0.58 (0.18-1.81)	0.40 (0.19-0.87)	0.43
Rheumatologic diseases	40 (1.2)	6 (0.2)	4.94 (2.10-11.64)	16 (0.6)	10 (0.4)	1.29 (0.59-2.83)	2.69 (1.54-4.70)	0.02
Neurological diseases	10 (0.3)	12 (0.5)	0.62 (0.27-1.43)	10 (0.4)	9 (0.4)	0.89 (0.36-2.20)	0.73 (0.40-1.35)	0.55
Cancer	18 (0.5)	10 (0.4)	1.33 (0.62-2.89)	10 (0.4)	6 (0.3)	1.34 (0.49-3.69)	1.34 (0.72-2.47)	0.99
Chronic renal failure	16 (0.5)	11 (0.4)	1.08 (0.50-2.32)	11 (0.4)	6 (0.3)	1.48 (0.55-3.99)	1.22 (0.66-2.23)	0.62

RR, Relative risk; CI, Confidence interval; MH, Mantel-Haenszel; COPD, Chronic obstructive pulmonary disease, *Relative risk comparing females to males in each town; **Mantel-Haenszel adjusted relative risk comparing females to males stratified by towns

We further investigated the risk factor distribution and statistical heterogeneity between the study towns. In Table 3, the Wald test chi-square p-value showed whether there was a statistically significant heterogeneity of relative risks between the two study-towns stratified by gender. We found statistically significant heterogeneity between the towns for smoking only. Our results showed strikingly high smoking rates, close to 50%, in males in both towns. Obesity was also a very prevalent risk factor among females in both towns (36.9% in Avanos and 41.5% in Gulsehir). Town specific and the Mantel-Haenszel adjusted relative risks (RR) for the aforementioned risk factors, comparing females to males in each town, were parallel to crude results presented above; females were 1.9 times more likely to be obese (RR=1.89, 95% confidence interval [CI], 1.77-2.02), but much less likely (RR=0.29, 95% CI, 0.27-0.31) to smoke and drink regularly (RR=0.13, 95% CI, 0.10-0.15; Table 3).

The baseline prevalence of non-communicable diseases for both towns in the Cappadocia region is shown in Table 4. There was no statistically significant heterogeneity between the towns (as shown by the Wald test p-values), except for rheumatologic diseases (p=0.02). Prevalence of rheumatologic diseases among females in Avanos was twice that of among females in Gulsehir, but the number of females with rheumatologic diseases was low (40 vs. 16 females). In both towns, hypertension was the most common chronic disease reported by the individuals, approximately one third of both males and females. DM was the second most commonly reported chronic condition followed by hyperlipidaemia and cardiovascular diseases. Reporting of COPD was surprisingly low in contrast to the high prevalence of smoking.

Discussion

We presented the study rationale, design details, and baseline data of the Cappadocia Cohort Study. This prospective cohort study allowed for the estimation of the prevalence rates and identification of risk factors of major chronic diseases in the Cappadocia region of Turkey and formed a study base for future community-level interventional studies. As an upper-middle-income country, Turkey faces a big influx of non-communicable diseases as shown by the recent National Burden of Disease Study and has to cope with this situation with limited resources.[2,29] This makes the identification of locally applicable, effective, and low-cost community interventions very important. Evaluation of these public health interventions will lead to a model for larger scale interventions to be applied at the national level in Turkey.

Baseline data concerning the sociodemographic and economic factors related to individuals and households showed that Avanos was slightly more educated and wealthier; an expected finding since tourism is an important source of income in Avanos compared with agriculture in Gulsehir. Household data showed that the mean size of households was similar to the national average but income was lower. In future studies, these differences between the Cappadocia Cohort and general Turkish population should be accounted for comparing incidence rates or results of community intervention trials.

The study cohort included two geographically and economically different towns and the heterogeneity of baseline data on chronic diseases and risk factors was examined across these towns. There was no significant heterogeneity between the towns, except for rheumatologic diseases (p=0.02). For behavioural risk factors, the towns did not also present major heterogeneity, except for smoking. Despite recent high profile campaigns and smoking bans in public places, we found high smoking rates in the study cohort. Conversely, self-reported COPD prevalence was very low in the study. In a study from Turkey, the prevalence of COPD was 5.3% based on spirometry and 4% based on physician diagnosis.[10] The low rates of COPD in the study cohort can be attributed to the fact that many residents might not be aware of a probable COPD diagnosis.

In the present study cohort, self-reported alcohol use was 2.2% among females and 17.5% among males. Alcohol consumption was defined as one drink per month; therefore, it should be carefully interpreted when drawing comparisons with data from other epidemiological studies. Furthermore, since drinking may be a social stigma in Muslim countries, there might have been a high probability of underreporting in alcohol consumption in the present cohort. The Global Adult Tobacco Survey Turkey Report using a similar definition of alcohol consumption as our study also showed low drinking rates; 8% of the population reported drinking alcohol once per month or more seldom.[9] We found that the rate of individuals with a BMI ≥30 kg/m^2 was 39.0% among females and 20.8% among males; these rates are similar with the increasing rates of ob esity in Turkey reported by the national-level study.[29]

The prevalence of major chronic diseases other than COPD in the present

study cohort was comparable to the national data reported in the literature. Nearly one third of the present study cohort had hypertension, which was similar to that reported for the population in the PatenT study.[30] In the present cohort, DM prevalence was 12.2% among females and 8.0% among males, which was also comparable to the prevalence reported as 13.7% among adults in the population based study (TURDEP-II survey).[7] The prevalence of hypertension, DM, and hyperlipidaemia were higher among females than in males; this was expected since obesity among females was more prevalent and increased with age. However, the prevalence of cardiovascular diseases among females and males were found close to each other.

One of the major strengths of the present study was its design. This was a long-term, longitudinal study in Turkey aimed to understand the incidence of non-communicable diseases. Its interventional component and selection of two towns would allow for comparisons to be drawn between the town receiving community interventions and the town referred as the control town. Very high participation rates, which allowed for little to no healthy participant selection bias, helped to strengthen the data validity. Low and similar rates of immigration and emigration in both towns also helped to prevent selection bias due to loss to follow-up. A major limitation of the present study was not having access to medical records of the study cohort at the time of baseline data collection. Another limitation for the interventional component would be the possibility of information contamination from the intervention town to the control town, which would result in conservative point estimates.

In conclusion, the present study confirmed high rates of behavioural risk factors such as smoking, obesity, and inactivity in the Turkish population. It is expected that chronic diseases constitute a growing problem for the Turkish population and healthcare system.

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