

# Turkish Twin Study: An Initial Step

Sevgi Yurt Öncel<sup>1</sup> and Fazil Aliev<sup>2,3</sup>

<sup>1</sup>*Department of Statistics, Faculty of Arts and Sciences, Kırıkkale University, Kırıkkale, Turkey*

<sup>2</sup>*Department of Statistics, Faculty of Science, Ankara University, Ankara, Turkey*

<sup>3</sup>*Department of Psychiatry, Virginia Institute for Psychiatric and Behavioral Genetics, Virginia Commonwealth University, VA, USA*

In this article we introduce the first twin study in Turkey with the future plan to register all twins born in Turkey for research purposes. The Turkish twin study will illuminate the etiology of health problems in the context of cultural differences, owing to the rich cultural diversity in Turkey. As a first step, we selected a sample of 618 twin individuals from 302 pairs and 14 singletons living in the Kırıkkale and Ankara regions of Turkey and administered a questionnaire with items about nicotine use, psychiatric disorders, and information about the family, in addition to zygosity items. Our study provides valuable information regarding factors related to nicotine dependence, age, gender, social situation, and family structure.

■ **Keywords:** nicotine dependence, Turkey, twin registry

## General Objectives

In the initial phase, the Turkish twin study aimed to investigate genetic and environmental factors affecting individuals' smoking status and related phenotypes, and to determine the risks for smoking behavior of Turkish twins in the context of cultural differences. Smoking is a widespread habit and a major public health problem in Turkey. Cardiovascular diseases and cancer are the top two causes of mortality in Turkey. The World Health Organization's (WHO) 2011 Global Adult Tobacco Survey estimated regular smoking rates in Turkey as 31.1% among all individuals (males 47.8%, females 15.1%; WHO, 2011). Eighty-seven percent of deaths from lung cancer and about 30% of other cancer-related deaths are caused by smoking in developed countries (Bozkurt et al., 2006). The twin study was carried out at Kırıkkale University, in Kırıkkale, Turkey. Kırıkkale is a city in the central Anatolian region of Turkey. It is located 80 km east of Ankara, the capital of Turkey. Until now, there have been no published studies on the smoking status of Turkish twins; furthermore, no twin data had been collected for any other research purpose.

## Recruitment Strategy

We used official birth records to identify approximately 1,200 potential participants. Due to limited start-up funds for this project, we were only able to contact 640 of these individuals, randomly selected from this larger list. There were 14 instances when only one individual from a twin

pair was interviewed. Four individuals refused to participate in our research due to the security agreements in their jobs as federal employees; their twins were removed from our list as well. Our final sample included 618 twins between ages 15 to 69 living in Turkey. The primary method of data collection was a face-to-face interview using two interviewers to ensure data quality. Each twin was interviewed separately. Completion took an average of 25 minutes. Municipal authorities also helped interviewers in rural regions to prevent misunderstandings during the data collection. All twins were interviewed following agreement with their families, and afterwards the interviewers presented the participants with official documents and explained research purposes and data security issues. Almost all individuals agreed to participate in the future follow-up studies, which will include DNA collection.

## Zygosity Diagnosis

Zygosity was determined based on responses to a standard zygosity questionnaire (Kaprio et al., 1978).

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ADDRESS FOR CORRESPONDENCE: Dr. Sevgi Yurt Öncel, Department of Statistics, Faculty of Arts and Sciences, Kırıkkale University, Kırıkkale, Turkey. E-mail: syoncel@gmail.com

**TABLE 1**  
Characteristics of the Study Population from a Twin Study, Turkey

Values of risk factors		Zygosity											
		MZ				DZ*				Total			
		Male		Female		Male		Female		Male	Female		
		n	%	n	%	n	%	n	%	n	%		
Smoking status	Non-smoker	64	29.9	83	38.8	117	31.6	143	38.6	181	30.7	226	38.1
	Former smoker	3	1.4	6	2.8	11	3	2	0.5	14	2.4	8	1.3
	Current smoker	45	21	13	6.1	77	20.8	16	4.3	122	20.5	29	4.7
Mother smoking status	No	95	44.4	88	41.1	181	48.9	138	37.3	276	46.8	226	37.3
	Yes	17	7.9	14	6.5	24	6.5	23	6.2	41	6.8	37	6.8
Father smoking status	No	60	28	68	31.8	141	38.1	100	27	201	34.3	168	28.1
	Yes	52	24.3	34	15.9	64	17.3	61	16.5	116	19.3	95	16.1
Income (US \$/month)	<1,200	72	33.6	60	28	140	37.8	111	30	212	35.9	171	29.2
	≥1,200	40	18.7	42	19.6	61	16.5	49	13.2	101	16.9	91	14.8
Mother's education status	≤Middle school	84	39.3	72	33.6	180	48.6	133	35.9	264	44.8	205	34.3
	≥High school	28	13.1	30	14	25	6.8	28	7.6	53	8.8	58	9.9
Father's education status	≤Middle school	58	27.1	42	19.6	141	38.1	104	28.1	199	33.3	146	24.5
	≥High school	52	24.3	60	28	64	17.3	57	15.4	116	20	117	19.6
Feeling moody	No	75	35	54	25.2	125	33.8	72	19.5	200	33.6	126	20.5
	Yes	37	17.3	48	22.4	78	21.1	86	23.2	115	19.6	134	23.1
Alcohol status	No	87	40.7	83	38.8	174	47	141	38.1	261	44	224	37.5
	Yes	25	11.7	19	8.9	30	8.1	20	5.4	55	9.4	39	6.7
Daily sports activities	No	58	27.1	75	35	126	34.1	129	34.9	184	31.2	204	34.3
	Yes	54	25.2	27	12.6	79	21.4	32	8.6	133	22.4	59	9.9
Marital status	Single	82	38.3	82	38.3	139	37.6	126	34.1	221	37.3	208	35.2
	Married	30	14	18	8.4	65	17.6	35	9.5	95	16.1	53	8.6
	Widow	0	0	2	0.9	0	0	0	0	0	0	2	0.3

Note: \*Includes both same-sex and opposite-sex dizygotic twins.

## Phenotypes

Participants responded to questions about age, gender, smoking status of his or her twin, smoking status and education levels of parents, income, daily sports activities, smoking history (age when started or quit smoking, daily average number of cigarettes smoked, attempts to quit smoking, the reasons for starting smoking), alcohol use, and behavioral problems. Answers to some of questions were determined by cross-checking twins' reports when possible and were defined as missing data if the twins conflicted.

## Sample Characteristics

We assessed 302 twin pairs and 14 single twins (330 males and 274 females, both smokers and non-smokers). The mean age of our twins was  $25.93 \pm 9.98$ , minimum 15, and maximum 69. Out of 302 pairs, 107 (35.4%) pairs were monozygotic (MZ), 186 (61.6%) pairs were dizygotic (DZ), and 9 (2.9%) pairs were of unknown zygosity.

It was difficult to identify the income level in Turkey because of the high inflation rate. Accordingly, income was coded 0 (income <US \$1,200/month) or 1 (income ≥US \$1,200/month). Parental education level was coded 0 (no school, primary school, secondary school, or middle school) or 1 (high school, university, or graduate school). According to a Turkish adaptation (Uysal et al., 2004) of the Fagerström Test for Nicotine Dependence (Fagerström, 1978), 178 participants (28.8%) were identified as smokers (smoking every day for a month or longer). Of these smokers, 79.2% were male and 20.8% were female. Table 1 provides frequency

distributions of some measured variables by zygosity on an individual basis.

## Future Directions

The proposed study is likely to provide valuable information regarding factors related to nicotine dependence, their relation to twin zygosity, gender, social situation, and family structure. We plan to compare our results with those from other well-known worldwide studies. The detailed analysis of these epidemiological data will provide important information about understanding nicotine dependence, which may inform efforts to prevent nicotine dependence. We plan to apply for research grants, recruit more subjects, and officially register the Turkish Twin Registry with the Turkish government.

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