

TEKHARF 2012: Genel ve koroner mortalite ile metabolik sendrom prevalansı eğilimleri

Turkish Adult Risk Factor Study survey 2012: overall and coronary mortality and trends in the prevalence of metabolic syndrome

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ÖZET

Amaç: Türk Erişkinlerinde Kalp Hastalıkları ve Risk Faktörleri (TEKHARF) çalışmasının 1) 2012 kohortu taramasına ilişkin ve birikimli ölüm ile koroner mortalite verilerinin; 2) metabolik sendrom (MetS) prevalansında bölgelerdeki ve son onyılda değişimlerin açıklanması.

Çalışma planı: Ölüm konusunda birinci derece akraba ve/veya sağlık ocağı personelinde bilgi alındı. Kardiyovasküler sistemin fizik muayenesi ve dinlenme elektrokardiyogramların Minnesota kodlamasına göre yaşayanlardan bilgi edinildi

Bulgular: Taranacak 1527 kişilik örneklemden 796'sı muayene edildi, 502 kişinin sağlık durumu hakkında bilgi edinildi ve 56 katılımcının öldüğü belirlendi. Ölümlerin 30'u koroner kalp hastalığı ve

ABSTRACT

Objectives: We aimed to analyze 1) overall and coronary mortality findings in the Turkish Adult Risk Factor (TARF) study survey 2012 and 2) the temporal trends in the prevalence of metabolic syndrome (MetS) and its distribution across seven geographic regions.

Study design: Information on the mode of death was obtained from first-degree relatives and/or health personnel of a local health office. Information collected in survivors was based on history, physical examination of the cardiovascular system and Minnesota coding of resting electrocardiograms.

Results: Of 1527 participants to be surveyed, 796 were examined. Information was obtained on the health status

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serebrovasküler olaya bağlandı. Tüm İki dönemde muayene edilen ve başlangıçta ortanca yaşı 46 olan aynı 1754 kişinin verilerine göre, MetS prevalansının son 12 yıl içerisinde bir yıl yaşlanma başına %1.3 oranında arttığı belirlendi. Analizler, sıklığı en fazla olan Güneydoğu Anadolu bölgesi ile birlikte Akdeniz bölgesinde prevalansın arttığını, Marmara bölgesinde gerilediğini, Ege bölgesinde görece seyrekliğinin sürdüğünü işaret etti.

Sonuç: Kırk yaş ve üzerindeki Türk erişkinlerde %53 olan MetS sıklığı, coğrafi bölgeler arasında önemli farklılıklar göstermekte, iki güney bölgemizde yüksek, Ege bölgesinde ise düşüktür.

in 502 subjects, and death was ascertained in 56 participants. Thirty deaths were attributed to coronary and cerebrovascular disease. Cumulative 22-year evaluation of participants in the age bracket 45-74 years revealed coronary mortality to be high, with 7.6 per 1000 person-years in men and 3.8 in women. Data used from 1754 identical subjects (median age 46 years initially), and examined in two periods 12 years apart, indicated an increase in the prevalence of MetS by 1.3% per aging of 1 year. Analysis across geographic regions showed a rise in the prevalence in the Mediterranean region, already having highest prevalence along with the Southeast Anatolia, while the prevalence declined in the Marmara region and persisted to be the lowest in the Aegean region.

Conclusion: The prevalence of MetS in Turkish adults aged 40 years or over, currently standing at 53%, shows significant differences across geographic regions, being highest in the two southern regions and lowest in the Aegean region.

Abbreviations:

CHD Coronary heart disease
MetS Metabolic syndrome
TEKHARF Heart Diseases, and Related Risk Factors in Turkish Adults
TÜİK Turkish Statistical Institute

TEKHARF (Heart Diseases, and Related Risk Factors in Turkish Adults) survey study which completed its 22 years, has created unique information about health state of Turkish adults, heart, and metabolic diseases and also made increasingly important contributions to the medicine for the last 5 years .[1] These series of information have opened new horizons in the pathogenesis of

cardiometabolic diseases, and become a candidate for an epoch-making survey.[2] Owing to this productivity, TEKHARF survey has analyzed long-term exposure of its monitored participants to various metabolic, and vascular risks, in detail. We deemed it our duty to traditionally explain analytical results of the participants monitored and examined during this year's (22.th) survey study. Besides, since metabolic syndrome (MetS) has precisely established itself as the predominant condition deteriorating metabolic state, and cardiac health in our community,[3] natural course of this syndrome within the last 10 years is an intriguing issue.

Whence, our aim in this article is to disclose the following information. 1) to

report number of overall, and coronary (CAD) deaths recorded in the cohort participated in the TEKHARF survey conducted near the end of 2012 summer which also included half of the people dwelling in 5 geographic regions of Turkey in the 45-74 age group, 2) to reveal the changing tendency in the frequency of MetS in various age groups within the years 2009-2011 in comparison with the frequency of MetS within the first few years of the 21th century, and point to interregional differences in the prevalence of MetS.

PATIENTS AND THE METHOD

Surveyed dwelling units, and participants monitored

Five regions of Turkey screened on even years in the TEKHARF study were surveyed again following a certain route (excluding Kütahya, Güre, Kaynaşlı, Zonguldak but including three quarters of Istanbul) in the beginning of fall 2012. Van Kars, Karapınar (HAG) and Diyarbakır cohorts (MA) were screened by two independent surveyors, while the main cohort was followed up by two teams. Screening of İçme (Elazığ) participants were postponed. The cohort to be surveyed consisted of a total of 1527 participants which constituted nearly half of the survived TEKHARF cohort [4] which will be followed up all over the country.

Total follow-up period was calculated as the sum of the individual follow-up periods of the participants examined with reliable information about their deaths or survivals. Loss to follow-up was defined as to be unexamined for at least for 8 years. Indeed, according to our experiences, the possibility of a participant

to return for a follow-up visit after more than 8 years is very low. In the analysis of long-term regional follow-up periods, only the time to the last examination date of the participant was regarded as the follow-up period. In participants who were lost to follow up, the shortest follow-up period recorded at baseline was ruled out.

Information acquisition method

During the study survey, information was obtained directly from anamnesis, physical (PE) , and electrocardiographic examinations. Information about the current health state of the patients who weren't examined was retrieved by phone contacts with themselves, close relatives, and neighbours. The data acquired were recorded, and these participants were followed up for 12 months or for shorter periods instead of 24 months.

Determination of death events, and some definitions

Information about the approximate date, place, type, and cause of the death event was gathered as far as possible. Death event occurring within 24 hours of the symptom onset was considered as sudden death, and if some other explanation of the death event could not be found, then it was attributed to cardiac causes. Information about the cause of death was gathered from the first degree relatives of the deceased and/or from the personnel of the primary health care center. Cause of death was also determined in consideration of available preexisting clinical, and laboratory findings detected in biennial survey studies. Coronary mortality involved deaths from coronary heart failure, and a fatal coronary event.

Proportion between our adult population, and the sampling size

Currently survived TEKHARF participants not lost to follow-up consisted of 3000 individuals, and based on the Turkish Statistical Institute (TÜİK) data on Turkish population aged 40 and over (total n, 24.4 million; 11.9 million male, and 12.5 million female individuals), our sampling represented 12.3/100.000 of the country's population in this age bracket.

Evaluation of the metabolic syndrome prevalence

Metabolic syndrome was defined based on, National Heart, Lung, Blood Institute/American Heart Association's criteria of abdominal obesity in men with application of ≥ 95 cm modification by TEKHARF. Peculiar characteristics of seven geographic regions were taken into consideration. For the comparison of prevalences of MetS, the same study participants examined during both 1997-2000, and 2009-2011 surveys which constituted most of the cohort were used. The impact of 12 years passed on aging was not actually ruled out, but their role was taken into consideration.

RESULTS

A. Follow-up data of the last survey

More than half (n= 796: 52 %) participants from a cohort of 1527 subjects (incl. 34 new individuals participating from Istanbul) were examined, and 56 (3.7 %) cases of death were identified. A little

more than one third (n=280) of the participants undergoing medical examinations were not screened during 2010 survey. Information was gathered from only one third of (502 individuals) the cohort, and 173 (11.3 %) were lost to follow-up. Total follow-up period reached to 2700 person-years. Fifty six cases of death corresponded to 20.7 cases per 1000 person-years during the whole follow-up period.

Mean age at death was 68.0 ± 15.7 years. A total of 54 deaths were identified (22 women, 34 men). Death events were related to coronary artery disease (n=24), cerebrovascular event (n=6; most of them are of embolic type), aortic stenosis (n=1), bilateral bundle branch fibrosis (n=1), renal failure (n=4), cancer (n=12), chronic obstructive pulmonary disease (n=2), Alzheimer's disease (n=1), diabetes (n=1), and indeterminate causes (n=3). In this survey period, coronary annual mortality was found to be 8.9/1000 participants.

B. Twenty years of the follow-up analysis.

Total mortality

Distribution of 742 death events occurred in all TEKHARF cohorts in specified periods, and mortality rates per 1000 person-years are presented in Table 1. Median (interquartile range) When participants born in 1952 (median year of interquartile range of 1941-1960) were relatively younger 3 years ago (median age 49 [36;66] years) among entire survey population, mortality rate was 11 deaths per 1000-person-years.

Table 1. In the TEKHARF survey study distribution of all deaths within cohorts, and certain time intervals

	Deaths	Follow-up period	1000/year
Old cohort			
1990-97/98	204	21900	9,3
97/98-02/03	137	13300	10,3
2002/03-11/12	269	19500	13,8
	610	54700	11,2
1997/98 cohort			
97/98-02/03	22	3140	7,0
2002/03-11/12	67	4860	13,8
	89	8000	11,1
2002/03 cohort	35	3820	9,2
2007/08 cohort	8	1270	6,3
All cohorts	742	67790	10,95

TEKHARF: Turkish Adult Risk Factor Study survey

All-cause, and coronary mortality in the 45-74 age bracket

All-cause, and coronary mortality rates in the 45-74 age bracket are explained based on distribution of gender, and the follow-up periods (Table 2). In this age group, during 21.5 years of follow-up annually 13.3 deaths per 1000 individuals (16.9 in men, and 9.8 in women) were recorded. Coronary mortality rates in this age range were 7.6, and 3.8 deaths per 1000 individuals as estimated from the start of the survey.

At the end of the survey number of cohorts suitable for further screening, and a new cohort enrolled from Istanbul.

Data stratified according to the enrollment period, and geographic regions of the participants of the cohort whom we had personal medical information, and physically examined at the end of the year 2012 who are also suitable for further follow up are explained in Table 3.

Starting from the finding that mean rates of mortality, and lost to follow-up among TEKHARF cohort participants during two years of the survey were 3, and 5 % respectively [4] we think that time has come to enroll new participants in the study. Based on the justification that number of cohort participants dropped to a total of 2703 individuals, 34 subjects from (mostly needed) Istanbul were additionally enrolled in the 2012 survey. It will be appropriate to enroll a new group of 180 participants in the 2013 survey from Marmara Region inhabitants.

Table 2. Incidence of all-cause, and coronary mortality in the TEKHARF 45-74 age cohort within 21.5 years

	Total			Male			Female		
	Follow-up period (year)	Deceased	n/1000	Follow-up period (year)	Deceased	n/1000	Follow-up period (year)	Deceased	n/1000
All-cause mortality									
Turkey1990-2000	11514	191	16,6	5705	116	20,3	5809	75	12,9
Turkey2000-2010	18912	204	10,8	9140	130	14,2	9772	74	7,6
Turkey 2011-2012	3906	60	15,4	1914	37	19,3	1992	23	11,5
Turkey 1990-2012	34332	455	13,3	16759	283	16,9	17573	172	9,8
Coronary mortality									
Turkey1990-2000	11514	73	6,3	5705	46	8,2	5809	27	4,7
Turkey2000-2010	18912	96	5,1	9140	64	7,0	9772	32	3,3
Turkey 2011-2012	3906	26	6,66	1914	18	9,4	1992	8	4,0
Turkey 1990-2012	34332	195	5,7	16759	128	7,6	17573	67	3,8

TEKHARF: Turkish Adult Risk Factor Study survey

Changes in the prevalence of MetS in the first, and the last survey study periods

Distribution of MetS prevalence according to age groups among 1750 participants examined in each of the two survey study periods separated by 12 years apart is presented in Table 4. In the beginning median (interquartile range) age was 46 (37;56) years, while in the last survey it was 57.5 (49; 68) years, and prevalence of MetS was found to be 51.8 percent. This increase in the abovementioned middle age group corresponds to an annual increase of 0.013.

Table 3 Cohorts suitable for future survey, and their distribution between regions

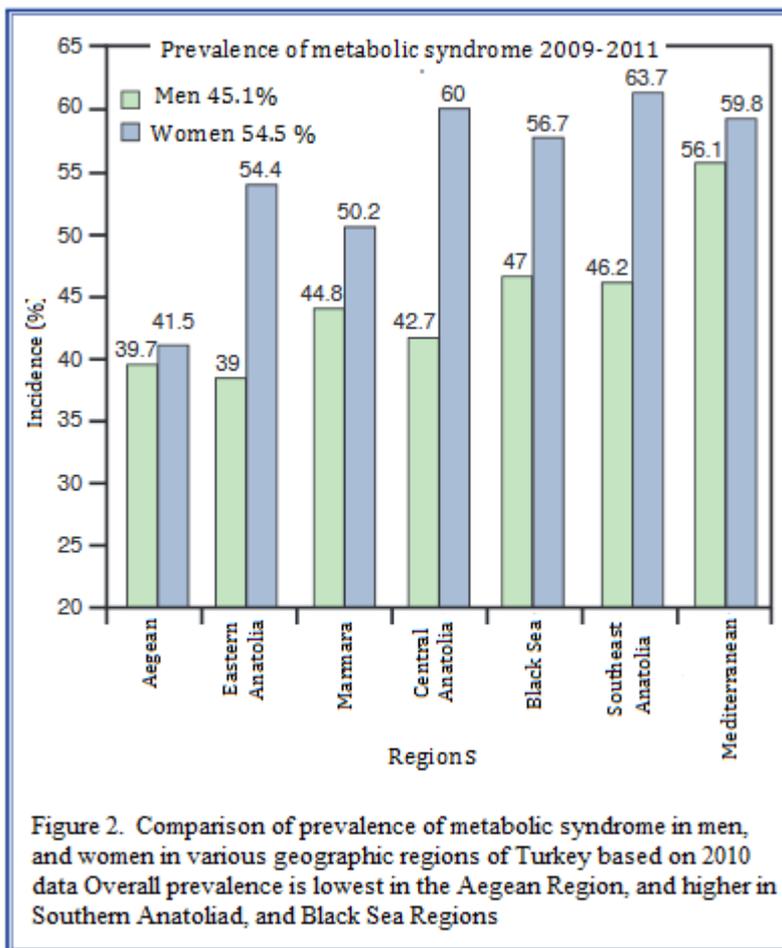
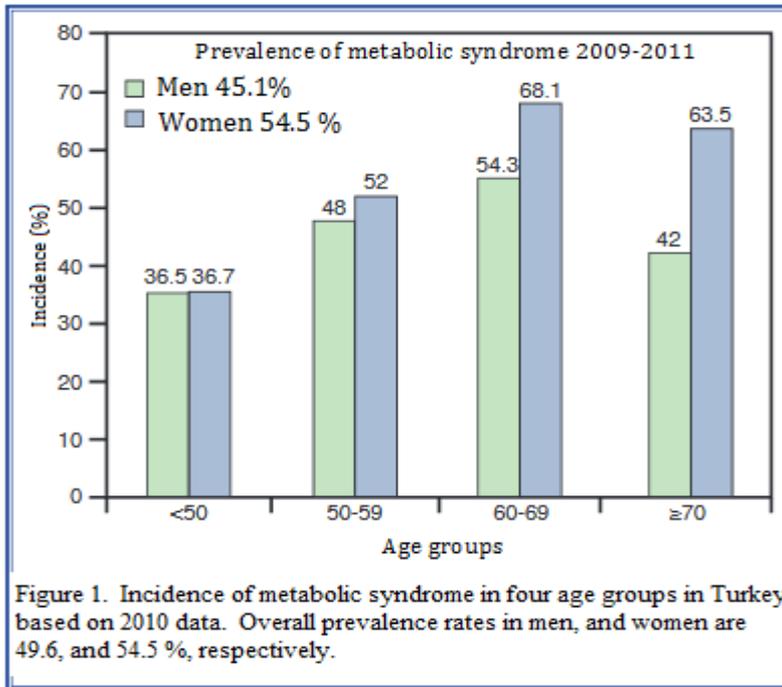
Cohorts	Total	Follow up in 2013	Follow up in 2014
Baseline	1640	871	769
1997/98 cohort	450	230	220
2002/03 cohort	311	140	171
2007/08 cohort	302	110	192
All regions incl.	2703	1351	1352
Marmara	660	585	75
Central Anatolia	520	520	
Aegean	377	134	243
Black sea	298	112	186
Mediterranean	359		359
Eastern Anatolia	235		235
Southeast Anatolia	254		254

The current prevalence of metabolic syndrome in the entire cohort of 3800 participants was estimated as, 49.9 %, while it was 45.1, and 54.5 % among male, and female populationsw, respectively, Distribution of prevalence rates based on age groups of male, and female participants is shown in Figure 1, while their distribution according to the geographic regions of the country is seen in Figure 2. Incidence of MetS increases up to 60-69 years of age, and then it decreases in advanced age (more conspicuous in men) in a ratio of one tenth. However in the first survey period,

≥ 70 age group accounts for 4 % of the MetS prevalence of the whole cohort, while in the last survey its share increases to 24 percent. Overall prevalence is the lowest in the Aegean Region, but it is higher in the Southern Anatolia, and the Black Sea Region. If one considers only the cohort of ≥ 40 years of age, and compare the first, and the last survey periods, overall prevalence remained stable (54 % vs 52.9 %). However in the Mediterranean Region its prevalence notably rised from 56.1 % to 63.6 percent. Its prevalence regressed only in the Marmara Region.

Table 4. Change in the incidence rates of metabolic syndrome in the same 1754 participants within a time interval of 12 years

	Incidence rates of the metabolic syndrome			
	n	1998	2010	n
Total (yrs)	1754	44,8	51,8	1754
30-39	581	27	7,1	14
40-49	501	45,1	35,2	440
50-59	352	60,2	51,1	560
60-69	249	60,2	66,8	371
≥ 70	71	56,3	59,3	369



DISCUSSION

Fifty six death events detected in the last survey study which included half of TEKHARF study population, represent the highest mortality rates reported so far, and a 1.4 –year shorter mean age at death was noteworthy. In all cohort, death events recorded in the 45-74 age bracket displayed an increasing trend to 16.9, and 9.8 deaths per 1000 person-years in parallel with the whole survey. Coronary mortality appears to be in a similar trend with 6.66 per 1000 person-years. Our findings were remarkable provided that the same definitions are used in both surveys. For example, annual prevalence of MetS among individuals participated in both surveys increased at a rate of 1.3 % within the previous 12 years, and its relatively lower levels sustained in the Aegean Region. Besides, its prevalence increased in the Mediterranean Region, but regressed in the Marmara Region

Based on a total number of 102 death events detected in 2011, and 2012 survey studies, (when distribution of age is considered, and coefficient of 7000 is applied) annual number of 350.000 death events among our population aged ≥ 40 years can be presumed. This estimate appears to be 10 % higher than that issued by the Turkish Institute of Statistics (TUIK) (321.000 for the year 2010) among Turkish population aged ≥ 40 years[4].

Coronary mortality rates apparently increased in parallel with the increasing tendency in the overall mortality rates. However certainly a trend concerning coronary mortality rates can not be deduced only from data obtained from two years of survey.

Variations in the prevalence of MetS

While evaluating variations in the prevalence of MetS in our people, it should be considered that our sampling size included lesser number of individuals younger than 40 years, and its prevalence gradually, and notably regressed especially in men from 70 years of age on. Based on this justification, we must state that we excluded participants younger than 40 years of age from both survey studies or analyzed the state of the same participants in both survey periods. In conclusion, we observed that MetS was present in half of our citizens in their middle, and advanced ages which represented a moderate increase in the prevalence within the previous ten years. We also observed that this increase was prominent especially in the Mediterranean Region, while it regressed in the Marmara Region. In another investigation of ours conducted nine years ago where unmodified ATP-III criteria were applied, the lowest prevalence was reported for the Aegean, and Eastern Anatolian Regions [7]. Though the source of regional differences can not be certainly determined, mostly malnutritional abdominal obesity can be predicted as a weighted determinative factor. A large scale correlation between distribution of MetS prevalence, and incidence of CHD [3] can be stated.

Limitations of the study

The main objectives of this study survey is to assess changes in the study cohort, and share the progressive variations in some fundamental data with our colleagues without indulging in analytical processes in depth. So being a link of a chain of

traditional article series, this survey study has certainly some limitations.

In conclusion, it will be appropriate to indicate that in our nationwide TEKHARF survey we have observed a slight increase in overall, and coronary mortality rates within the last 2 years irrespective of aging. The incidence of MetS among our citizens aged 40 years or older is 53 %, but it increases moderately within the last 10 years with varying frequencies among geographic regions. Overall prevalence of Mets in southern Anatolia, and Black Sea regions is higher, while it is persistently lower in the Aegean Region We have also observed higher prevalence rates for MetS in the Mediterranean Region, but its prevalence regressed in the Marmara Region.

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Conflict of interest: None declared

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Anahtar sözcükler: Koroner arter hastalığı; metabolik sendrom X; mortalite; Türkiye/epidemioloji.

Key words: Coronary artery disease; metabolic syndrome X; mortality; Turkey/epidemiology.