Gastroesophageal reflux symptoms in Turkish people: a positive correlation with abdominal obesity in women

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ABSTRACT

OBJECTIVE: Metabolic syndrome (MetS) is increasing around the world due to abdominal obesity with altered eating habits and decreased physical activity. The aim of this study was to determine the risk factors for gastroesophageal reflux disease (GERD) symptoms and the prevalence of GERD in patients with MetS.

METHODS: Five hundred patients (MetS, n=300 and the control group, n=200) were enrolled in the study. A detailed questionnaire reflux symptoms and behavioral habits was performed.

RESULTS: Sixty percent of the subjects were with MetS. GERD rate was significantly higher in the group with MetS compared to subjects without MetS (50.7% vs 26%). Women were more likely to have GERD in both groups (62.6% of women and 28.6% of men in the MetS group while corresponding rates were 37% vs 16.7% in the control group). Waist circumferences were found to be higher in female MetS patients with GERD.

CONCLUSION: GERD is present approximately in every one of the two patients with MetS. Every patient who has MetS should be evaluated in terms of GERD symptoms.

Key words: Abdominal obesity; gastroesophageal reflux; metabolic syndrome; obesity; Turkish population.

Gastroesophageal reflux disease (GERD) is frequently observed together with MetS [1]. Prevalence of metabolic syndrome (MetS) is increasing around the world due to abdominal obesity with altered eating habits and decreased physical activity. GERD worsens quality of life, and may cause diseases involving esophagus such as esophagitis, Barret esophagus, adenocarcinoma, and many additional diseases such as laryngitis, morning hoarseness and aspiration syndrome as a result of regurgitation of the stomach contents into the pharynx and the mouth [2, 3]. These kinds of chronic complications can be prevented with active questioning of GERD symptoms in patients with MetS.
The aim of the present study was to determine the risk factors and the prevalence of GERD symptoms in patients with MetS.

**MATERIALS AND METHODS**

The study was conducted in Goztepe Training and Research Hospital outpatient clinics between 2008 and 2009. Five hundred patients (MetS, n=300 and the control group, n=200) were enrolled in the study. MetS was identified according to the criteria of The International Diabetes Federation (IDF) [4]. Exclusion criteria were pregnancy, hormone replacement therapy, history of gastric surgery. The study protocol was designed in accordance with the relevant criteria of Helsinki Declaration and was approved by the local ethics committee of Goztepe Training and Research Hospital. Subjects provided their written informed consent. Demographic and clinic data were recorded. Their physical examination was performed; height, weight, and waist circumference measurements were performed. Body mass index (BMI) was calculated by dividing weight in kg by height in m². Systolic and diastolic blood pressures (BP) were recorded. Waist circumferences were measured at the plane between anterior superior iliac spines and lower costal margins at the narrowest part of the waistline while patients were standing during slight expiration. Waist circumferences >80 cm for women and >94 cm for men were accepted as abdominal obesity according to IDF. A detailed questionnaire asking reflux symptoms and behavioral habits was performed. GERD symptoms were defined as a ‘yes’ response to all three of the following components: the presence or absence of heartburn, indigestion or pain in your stomach, a tender point palpated on the upper abdomen and relief with antacid. Related risk factors such as tobacco smoking, alcohol intake, eating habits, physical activity and the sleeping position were investigated in both groups.

**Statistical analysis**

NCSS (Number Cruncher Statistical System), 2007&2008 Statistical Software PASS (Utah, USA) program were used. Student’s t test was used for comparison of descriptive statistical data (mean, standard deviation, frequency) as well as quantitative parameters showing normal distribution of data between groups. The chi-square test was used to compare qualitative data.

**Table 1.** Demographic data of the patients

|                    | MetS group | Control group | p   |
|-------------------|------------|---------------|-----|
| Female            | 67.9%      | 50.7%         |     |
| Mean±SD           |            |               |     |
| Age               | 52.83±9.85 | 51.86±12.71   | 0.21|
| BMI (kg/m²)       | 32.43±4.88 | 23.42±2.69    | 0.001|
| Waist circumference (cm) | 107.89±10.45 | 82.86±7.88 | 0.001|

**Table 2.** Reflux prevalence in groups

|       | MetS |   | Control |   | p   |
|-------|------|---|---------|---|-----|
|       | n    | % | n       | % |     |
| Reflux|      |   |         |   |     |
| +     | 152  | 50.7| 52      | 26.0| 0.001**|
| -     | 148  | 49.3| 148     | 74.0|     |
The study was completed with 500 patients (213 M, 287 F). Sixty percent of the subjects were diagnosed with MetS (Table 1). GERD rate was significantly higher in the group with MetS as compared to the group without MetS (50.7% vs 26%) (Table 2). Women were more likely to have GERD in both groups (MetS, and the control groups, women: 62.6 vs 37% and men, 28.6 vs 16.7%) (Table 3). Waist circumferences were found to be higher among female MetS patients with GERD (Table 4). Smoking rate was lower in the group with metabolic syndrome. GERD prevalence was found to be higher in nonsmokers. Alcohol consumption rates were similar between subjects with and without GERD. Subjects with GERD were found out to eat larger sized meals. A habit of eating three hours before bedtime was associated with GERD. Physical activity level at work was not correlated with GERD while lesser physical activity during leisure times was significantly correlated with GERD. There was no relation between the type of lying position and GERD (Table 5).

### Table 3. Reflux prevalence in groups according to the gender of the patients

| Reflux | Female | Male | p     |
|--------|--------|------|-------|
|        | n   | %   | n    | %    |
| MetS   |     |     |      |      |
| +      | 122 | 62.6| 30   | 28.6 | 0.001**|
| –      | 73  | 37.4| 75   | 71.4 |
| Control group | | | | |
| +      | 34  | 37.0| 18   | 16.7 | 0.001**|
| –      | 58  | 63.0| 90   | 83.3 |

### Table 4. Reflux prevalence according to waist circumference

| Reflux | n | % | n | % |
|--------|---|---|---|---|
| Waist circumference (women) | | | | |
| <80 cm (31.5 in) | 34 | 21.8 | 58 | 44.3 |
| 80-88 cm (31.5-34.6 in) | 5 | 3.2 | 0 | 0 | 0.001**|
| >88 cm (34.6 in) | 117 | 75.0 | 73 | 55.7 |
| Waist circumference (men) | | | | |
| <94 cm (37 in) | 18 | 37.5 | 90 | 54.5 |
| 94-102 cm (37-40.2) | 7 | 14.6 | 21 | 12.7 | 0.100|
| >102 cm (40.2) | 23 | 47.9 | 54 | 32.7 |
TABLE 5. Reflux prevalence in groups according to daily habits

| Smoking status        | Reflux | p     |
|-----------------------|--------|-------|
|                       | +      | -     |       |
|                       | n      | %     | n      | %     |
| Nonsmoker             | 123    | 46.4  | 142    | 53.6  |
| Irregular smoker      | 37     | 36.3  | 65     | 63.7  |
| Former smoker         | 25     | 30.9  | 56     | 69.1  |
| Current smoker        | 19     | 36.5  | 33     | 63.5  |
|                       | 0.045* |

The number of cigarettes smoked daily by current smokers (n=52)

| Smoking status | Reflux | p     |
|----------------|--------|-------|
|                | +      |       |
|                | n      | %     |
| <5             | 4      | 80.0  | 1      | 20.0 |
| 5-20           | 12     | 30.8  | 27     | 69.2 |
| >20            | 3      | 37.5  | 5      | 62.5 |
| Alcohol consumption
|                | +      |       |
|                | n      | %     |
| +              | 5      | 33.3  | 10     | 66.7 |
| -              | 199    | 41.0  | 286    | 59.0 |
| The size of meals
|                | +      |       |
|                | n      | %     |
| Small          | 43     | 27.7  | 112    | 72.3 |
| Medium         | 81     | 41.1  | 116    | 58.9 |
| Large          | 80     | 54.1  | 68     | 45.9 |
| Eating 3 hours before bedtime
|                | +      |       |
|                | n      | %     |
| Never          | 34     | 23.6  | 110    | 76.4 |
| Rare           | 99     | 40.2  | 147    | 59.8 |
| Often          | 56     | 59.6  | 38     | 40.4 |
| Very often     | 15     | 93.8  | 1      | 6.3  |
| Physical activity at work
|                | +      |       |
|                | n      | %     |
| Minimal        | 64     | 41.8  | 89     | 58.2 |
| Average        | 108    | 44.1  | 137    | 55.9 |
| Heavy          | 32     | 31.4  | 70     | 68.6 |
| Physical activity at leisure time
|                | +      |       |
|                | n      | %     |
| Minimal        | 128    | 56.6  | 98     | 43.4 |
| Average        | 67     | 32.1  | 142    | 67.9 |
| Heavy          | 9      | 13.8  | 56     | 86.2 |

Sleeping position

| Sleeping position | Reflux | p     |
|-------------------|--------|-------|
|                   | +      |       |
|                   | n      | %     |
| Right side        | 130    | 43.0  | 172    | 57   |
| Left side         | 47     | 39.5  | 72     | 60.5 |
| Supine position   | 12     | 34.3  | 23     | 65.7 |
| Prone position    | 15     | 34.1  | 29     | 65.9 |

DISCUSSION

This study showed that waist circumference is the most important factor for GERD in female patients with MetS. It is well documented that obesity increases the risk of GERD [5, 6]. With the growing interest in MetS similar recent studies were performed on coexistence between GERD and MetS [1]. In a
study conducted with 2457 people in Korea, abdomi-

nal obesity was found as a more important factor in
the development of erosive gastritis than body mass
index [7]. In another study, metabolic syndrome and
increased insulin resistance were found to increase
the risk of development of erosive esophagitis [8].

Visceral obesity increases intragastric pressure
and leads to reflux esophagitis. Visceral fat is meta-
bolically active and it has been associated with low
serum levels of protective cytokines, such as adiponectin,
and high levels of inflammatory cytokines,
such as tumor necrosis factor (TNF)-α, interleukin
(IL)-1β and IL-6 [9, 10].

In the present study, GERD prevalence was
found to be higher in women in contrast to the
prevalence rates reported for a Japanese cohort [1].

In a large cross-sectional study on abdominal
obesity, GERD symptoms and ethnicity of 80110
members of a health organization were investigated.
It was found that increased abdominal circumfer-
ence adjusted for BMI, was an independent risk fac-
tor for reflux symptoms (OR, 1.85; 95% CI, 1.55-
2.21) in the white population but not among blacks
and Asians which was not influenced by gender
[11]. Higher GERD prevalence in Turkish women
with MetS in the present study as compared to
Japanese women [12] can be related to higher waist
circumference of the former group.

Cigarette smoking and alcohol consumption are
well known risk factors for GERD [13-16].

We did not find a correlation with smoking or
alcohol consumption and GERD, possibly because of
higher nonsmoking rate in subjects with meta-
bolic syndrome and very limited alcohol consump-
tion in our population.

Although eating larger- sized meals and eating
especially three hours before bedtime were associ-
ated with GERD in accordance with the results of
other studies [10], we haven’t observed any correla-
tion between GERD and physical activity level at
work and observed a negative correlation between
GERD, and the intensity of leisure time activity.
Accumulating information about GERD indicates
that GERD coexists with vigorous rather than
moderate exercise [17, 18]. Since gastric fullness in-
creases the possibility of GERD [19], leisure time
is more convenient for exercises. Investigating sleep-
ing position, any of lying position did not show as-

associated with GERD.

Present study is based on a questionnaire survey.
An endoscopic evaluation of the study population
would be more enlightening.

Conclusion: GERD is present approximately in
every one of the two patients with MetS. Every pa-
tient who have MetS should be evaluated in terms
of GERD symptoms.

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