Epigastric Pulsation: Prevalence and Association with Co-Morbidities in Saudi Population, a Cross-Sectional Descriptive Study

Manal Abdulaziz Murad 1, Hoda Jehad Abousada 2, Faisal Abdulaziz Almutairi 3, Emad Bani Alharbi 4, Khalid Saad Alrashdi 5, Dr. Mujib Mualla Alotaibi 6, Khalil Hassan Jafari 7, Mohammed Oqab Althagafi 8, Majed Rabie Alhamdan 9, Saud Mohammed Alotaibi 10

1 Assistant Professor of Family Medicine, Consultant Family Medicine, Family Medicine Department, King Abdulaziz University, Jeddah, Mmurad@kau.edu.sa
2 Corresponding Author: KSA (Postal Address: Jeddah, 22338; dr.huda1992@outlook.com)
3 Student at Qassim University, KSA; faisal90511@gmail.com
4 Medical student at Qassim University, KSA; emadbani30@gmail.com
5 Medical Student at Qassim University, KSA; kloooode512@hotmail.com
6 Medical Intern, Shaqraa University, KSA; mujib-08@hotmail.com
7 Medical Intern, Jazan University, KSA; khalil20901@gmail.com
8 Medical Intern, Taif University, KSA; oga_5@hotmail.com
9 Physician, East Jeddah Hospital, KSA; majed.alhamdan.3@gmail.com
10 Medical Intern, Shaqra University, KSA; Saudm10@outlook.com

Corresponding author: Hoda Jehad Abousada; Email: dr.huda1992@outlook.com

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Abstract

Epigastric pulsation is feeling of pulsation between the xiphoid process and the umbilicus. It can be found normally in population (especially in thin lean people) or abnormally as a sign or a symptom of other diseases, such as heart, liver, and aortic disease.

This descriptive study, using a questionnaire, assesses the prevalence of epigastric pulsation among 878-case sample, the association with other diseases especially DM, smoking history and obesity. Prevalence was 51.7%. Most common disease to be associated with epigastric pulsation is gastrointestinal disease. No association was found with DM. Positive association was found between smoking history and BMI, and the feeling of epigastric pulsation.

Keywords: Epigastric pulsation, abdominal aortic aneurysm, diabetes, smoking, obesity.

Introduction

Epigastric pulsation is defined as feeling a pulsation in the upper abdomen, just below the xiphoid process, and above the level of the umbilicus [1]. Epigastric pulsation can be found normally in thin people, and abnormally in several pathological conditions, most importantly and commonly: Abdominal aortic aneurysm [2]. Other less common causes of epigastric pulsations include: liver vascular tumors, and right heart failure or valvular disease.

Abdominal Aortic Aneurysm (AAA) is a localized enlargement of the abdominal aorta such that the diameter is greater than 3 cm or more than 50% larger than normal [3]. Symptoms and signs of are either non-sensitive, non-specific, or not found. Most AAAs are found incidentally during work-up for chronic back pain, or kidney stones.

Evaluation of a patient with epigastric pulsation varies depending on the history of the patients and their risk factors. An epigastric pulsation in a thin healthy young adult is considered normal, while the same sign in a patient with known AAA is a case of emergency, and should be evaluation as ruptured AAA until proven otherwise [1].

Literature review

According to literature, there are no studies addressing the prevalence of epigastric pulsations per se, nor its association with other comorbidities. Literature focuses on AAA instead.
According to a literature review conducted in 2014, AAA is a common disease in Western Countries, especially among males older than 65 years (4–7% prevalence), although the prevalence is decreasing in the last years [4].

Risk factors for AAA include: age older than 65 years, male sex, and smoking history [5]. Another study suggests female sex, and high Mean arterial pressure as potential risk factors for mechanical rupture of AAA [11]. More than 90% of AAA patients have a smoking history at some point of their lives [6]. Other risk factors of AAA include: Alcohol, hypertension [8], genetics: familial predisposition, male predominance, and enzyme deficits [7], connective tissue syndromes like Ehler’s-Danlos syndrome, relapsing polychondritis and polyexanthoma elasticum [8].

Another condition associated with AAA is Atherosclerosis, which is considered to be a risk for progression of AAA, but doesn’t explain the development of AAA [8].

As for association of AAA with other comorbidities, diabetes mellitus could be a protective factor against development of AAA according to a systematic review for English-literature articles up to September 2009. In this review, prevalence of diabetes in AAA patients ranged from 6 to 14%. The prevalence of diabetes in control patients without AAA ranged from 17% to 36%. Pooled analysis pointed to decrease in diabetes rates among patients with AAA, compared to those without [9]. In another Danish case-control study conducted from 1996 until 2016 on more than 3000 participants, diabetes was not found to increase risk of ruptured AAA, nor its 30-day mortality [10]. In another metanalysis, non-diabetic state was found to be protective against AAA [14].

Smoking, however, according to a clinical research study conducted in France on more than 8000 patients, it was found that smoking is highly associated with development and growth of AAA, and has a twofold rupture risk as well [12]. Addressing variation between the two sexes, a systematic review conducted in 2015 to follow the evidence of association between AAA and women concluded that female smokers are more likely to have AAA, and have more rupture risk [13].

Another aspect of literature to be reviewed is that addressed to the association between the BMI and AAA development and rupture risk. According to the Society for Vascular Surgery practice guidelines, higher height of patients can be associated with higher risk for developing AAA [14]. Another review of association between obesity and AAA presence and growth, 8 studies were reviewed, and five of them were assessing the association between BMI and AAA. Three of the five studies found a positive association between increased BMI and AAA, while the other two concluded that there no relationship between increased BMI and AAA [16]. As for central obesity correlation with AAA, in a clinical research addressing that correlation, the researcher reviewed conflicting evidence regarding the relationship between are central obesity and AAA. The researcher addressed a conflict in studies assessing the correlation between AAA and central obesity. This analytical study ended up supporting lack of relationship between AAA and central obesity [14].

**Aim**

To determine prevalence of Epigastric Pulsion.

### Tables 1: Characteristics of respondents

| Sample       | 878 cases |
|--------------|-----------|
| Age groups   |           |
| Below 30 years | 603 (68.7 %) |
| 30 – 40 years | 186 (21.2 %) |
| Above 40 years | 89 (10.1 %)  |
Most common disease associated with epigastric pulsation
Among participants that reported feeling an epigastric pulsation, gastrointestinal disease was the most common associated with these cases with a percentage of 9%.

| Comorbidities                      | No comorbidities | Diabetes mellitus | Cardiovascular diseases | Respiratory disease | Gastrointestinal disease | Nervous system disease | High blood cholesterol | Others |
|------------------------------------|------------------|-------------------|-------------------------|--------------------|-------------------------|------------------------|------------------------|--------|
| Male                               | 315 (40%)        | 20 (2.3%)         | 14 (1.6%)               | 50 (5.7%)          | 79 (9%)                 | 26 (3%)                | 29 (3.3%)              | 74 (8.4%)         |
| Female                             | 527 (60%)        |                   |                         |                    |                         |                        |                        |        |
| Non-smoker                         | 678 (77.2%)      |                   |                         |                    |                         |                        |                        |        |
| Smoker                             | 155 (17.7%)      |                   |                         |                    |                         |                        |                        |        |
| Ex-smoker                          | 45 (5.1%)        |                   |                         |                    |                         |                        |                        |        |

Association with DM
As shown in table 2: among respondents who reported having epigastric pulsation, mean value of their answers reporting having DM was 0.154 (+/- .12335 SD), while mean value of their answers reporting not having DM was 0.307 (+/- .17260 SD), highlighting that DM is not associated with having a feeling of epigastric pulsation.

Table 2: Association of epigastric pulsation with Diabetes mellitus
| Diabetes Mellitus? | Mean (+/- SD) |
|--------------------|---------------|
| No                 | 0.307 (+/- .17260) |
| Yes                | 0.154 (+/- .12335) |

Association with Smoking
However, as shown in table 3, among respondents who reported to have epigastric pulsation, mean value of their answers reporting being non-smokers was 0.5118 (+/- .50023 SD), while their the mean value of their answers reporting being ex-smokers was 0.5333 (+/- .50452), highlighting that smoking is not strongly associated with having a feeling of epigastric pulsation, although this feeling occurs more frequently in smokers.

Table 3: Association of epigastric pulsation with Smoking
| Smoking? | Mean (+/- SD) |
|----------|---------------|
| Non-smoker | 0.5118 (+/- .50023) |
| Smoker     | 0.5355 (+/- .50036) |
| Ex-smoker  | 0.5333 (+/- .50452) |

Association with BMI
According to our results, BMI has a higher mean value in respondents reported having an epigastric pulsation, than those who didn’t.

Discussion
We present the results of a cross-sectional study based on a questionnaire distributed among a sample of Saudi population. With 878 cases, we found that prevalence of epigastric pulsation reached 51.7% of the sample. Most common disease associated with epigastric pulsation is gastrointestinal disease. DM is not associated with feeling of epigastric pulsation. Smoking is not strongly associated, yet this feeling more likely to occur in smokers. BMI was found higher in patients reporting having a feeling of epigastric pulsation.

To our knowledge, this is the first study to address the prevalence of epigastric pulsation per se. according to evidence, this feeling can occur in several entities. Normally, thin people can have epigastric pulsation feeling. Various kinds of diseases can be associated with such feeling, such as right heart disease, liver tumors, and abdominal aortic disease [2,3]. The results of this research are highly exposed to the subjectivity of respondents, and it assesses a “symptom” that can be found in normal or abnormal conditions. That’s why there are some differences between the results of this research and other literature.

In a study published in France, there was a strong association between smoking and development of AAA [12]. This supports the result of this research of addressing a higher feeling of epigastric pulsation among smokers, which could point toward an abdominal aortic disease.

With the same direction of what literature confirms, this study has not found a strong relation with DM. This goes with the literature supporting that DM has no relation with abdominal aortic disease.

A conflict of relationship with BMI is addressed in literature. In this study, respondents with higher BMI were more likely to have a feeling of epigastric pulsation, although a meta-
analysis assessing this relationship supported the opposite, yet it has addressed that literature conflict.

**Conclusion**

The prevalence of epigastric pulsation equals more than half the sample. Most common disease associated with epigastric pulsation is gastrointestinal disease. DM was not found to be associated with feeling of epigastric pulsation. Smoking is not strongly associated, yet this feeling is more likely to occur in smokers. BMI was found higher in patients reporting having a feeling of epigastric pulsation.

**Data management and analysis**

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 17. Descriptive statistics were displayed as frequencies and percentages for categorical variables. Measures of central tendencies (the median), and measures and dispersion (minimum – maximum) were used to summarize continuous variables, as the continuous variables were not normally distributed when tested by Shapiro-Wilk test. Univariate analysis was performed to investigate the association between the exposure factors with the outcome on the one hand, this was performed using Chi-squared test and Mann-Whitney test. Multivariate analysis to investigate factors independently was performed using binary logistic regression. P value was set at a significance level of < 0.05.

**Data availability**

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

**Conflicts of interest**

None.

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