

OVERLAPPING OF FUNCTIONAL ESOPHAGEAL DISORDERS AND IRRITABLE BOWEL SYNDROME, IN MUSICIANS AND ATHLETES



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

SOBREPOSIÇÃO DE DISTÚRBIOS ESOFÁGICOS FUNCIONAIS E SÍNDROME DO INTESTINO IRRITÁVEL EM MÚSICOS E ESPORTISTAS

SOBREPOSICIÓN DE TRASTORNOS ESOFÁGICOS FUNCIONALES Y SÍNDROME DEL INTESTINO IRRITABLE EN MÚSICOS Y DEPORTISTAS

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ABSTRACT

Introduction: Functional gastrointestinal disorders (FGIDs) are the most common disorders in the general population. These disorders can overlap, decreasing the quality of life. **Objective:** We analyzed the prevalence of functional esophageal disorders (FED) and irritable bowel disease (IBS), and their overlapping and associated factors in musicians and athletes. **Methods:** A cross-sectional study was conducted using FGID and associated factors questionnaires administered to four groups: instrumentalists, singers, athletes, and a control group of healthy volunteers. **Results:** Of the 161 subjects, 62 (38.51%) had only FED, 76 (47.2%) had only IBS, and 23 (14.29%) had FED-IBS overlap. Subjects with FED-IBS overlap had more severe symptoms of IBS, especially hard and lumpy stools and constipation, compared to those with IBS alone. IBS subtype was more frequent in the overlap group, while not specified IBS type was less frequent. Regarding FED, we found that subjects with FED-IBS overlap had more functional heartburn and less functional dysphagia symptoms. There was a higher risk of overlap in instrumentalists and smokers. **Conclusions:** FED and IBS are frequently encountered in musicians and athletes. Subjects with FED-IBS overlap presented more frequent and severe symptoms. Instrumentalists and smokers are at higher risk of overlap. **Level of Evidence IV; Case series.**

Keywords: Esophageal diseases; Irritable bowel syndrome; Comorbidity; Music; Athletic performance.

RESUMO

Introdução: Os distúrbios gastrintestinais funcionais (DGIF) são os mais comuns na população em geral. Esses distúrbios podem se sobrepor, diminuindo a qualidade de vida. **Objetivo:** Analisamos a prevalência dos distúrbios funcionais esofágicos (DFE) e da síndrome do intestino irritável (SII), sua sobreposição e os fatores associados em músicos e esportistas. **Métodos:** Realizou-se um estudo transversal por meio de questionários sobre DGIF e fatores associados, administrados a quatro grupos: instrumentistas, cantores, esportistas e um grupo controle de voluntários saudáveis. **Resultados:** Dos 161 indivíduos, 62 (38,51%) tinham só DFE, 76 (47,2%) tinham só SII e 23 (14,29%) tinham sobreposição de DFE e SII. Os indivíduos com sobreposição de DFE e SII tinham sintomas mais intensos de SII, especialmente fezes duras e encarçadas e constipação em comparação com os que tinham só SII. O subtipo SII foi mais frequente no grupo de sobreposição, enquanto o tipo SII indefinido foi menos frequente. Quanto ao DFE, verificamos que os indivíduos com sobreposição DFE-SII tinham mais sintomas de azia funcional e menos de disfagia funcional. Houve maior risco de sobreposição em instrumentistas e fumantes. **Conclusões:** DFE e SII são frequentes em músicos e esportistas. Os indivíduos com sobreposição de DFE e SII apresentaram sintomas mais frequentes e mais severos. Os instrumentistas e os fumantes têm maior risco de sobreposição. **Nível de Evidência IV; Série de casos.**

Descritores: Doenças do esôfago; Síndrome do intestino irritável; Comorbidade; Música; Desempenho atlético.

RESUMEN

Introducción: Los trastornos gastrointestinales funcionales (TGIF) son los más comunes en la población en general. Estos trastornos pueden sobreponerse, disminuyendo la calidad de vida. **Objetivo:** Analizamos la prevalencia de los trastornos funcionales esofágicos (TFE) y del síndrome del colon irritable (SCI), su superposición y los factores asociados en músicos y deportistas. **Métodos:** Se realizó un estudio transversal por medio de cuestionarios sobre TGIF y factores asociados, administrados a cuatro grupos: instrumentistas, cantantes, deportistas y un grupo control de voluntarios sanos. **Resultados:** De los 161 sujetos, 62 (38,51%) tenían sólo TFE, 76 (47,2%) tenían sólo SCI y 23 (14,29%) tenían superposición de TFE y SCI. Los individuos con superposición de TFE y SCI tenían síntomas más intensos de SCI, especialmente heces duras y grumosas y estreñimiento en comparación con los que tenían sólo SCI. El subtipo SCI fue más frecuente en el grupo de superposición, mientras que el tipo de SCI no especificado resultó menos frecuente. En cuanto al TFE, verificamos que los sujetos con superposición TFE-SCI tenían más síntomas de pirosis funcional y menos de disfagia funcional. Hubo mayor riesgo de superposición en instrumentistas y fumadores. **Conclusiones:** TFE y SCI son frecuentes en músicos y deportistas. Los sujetos con superposición de TFE y SCI presentaron síntomas más frecuentes y más severos. Los instrumentistas y los fumadores tienen mayor riesgo de superposición. **Nivel de Evidencia IV; Serie de casos.**

Descriptor: Enfermedades del esófago; Síndrome del colon irritable; Comorbilidad; Música; Rendimiento atlético.



INTRODUCTION

The gastroesophageal reflux disease (GERD) and the irritable bowel syndrome (IBS) are both commonly encountered conditions. They may overlap.^{1,2} GERD patients may present IBS in almost 50% of cases and 40% of IBS patients have GERD.³ Overlapping may impair the clinical state of the patients and deteriorate quality of life, because of the multiple complaints. The functional esophageal disorders (FED) may be also present in IBS patients in 16-29%.^{4,5} From these, functional esophageal reflux and hypersensitive esophagus have similar symptoms with GERD.⁶ Some of the professions are at risk to develop GERD, including musicians.^{7,8} Stress job may be associated with FGID including IBS and/or FED. Music and sport performers are submitted to professional stress. To our knowledge there are few studies assessing IBS and FED in these vocational groups.

Thus, the aim of this study was to assess the prevalence of FED and IBS, their overlap and factors associated with the overlap in musicians and sports performers. We managed to succeed in our endeavor.

MATERIAL AND METHODS

We performed a cross-sectional survey using several questionnaires administered to four subject groups: music instrumentists, vocal singers, sportsmen and a control group. Questionnaires were administered by instructed research staff. All responders gave their informed consent and filled themselves the questionnaires. The research has been complied with all the relevant national regulations, institutional policies and in accordance the tenets of the Helsinki Declaration, and has been approved by the authors' institutional review board.

The musician group comprised professionals with interpretive activity, and students in Music Academies. The vocal singers group comprised of, soloists, and students in Music Academies.

The sportsmen group comprised professional players (handball players, rugby players, judo players, bodybuilders, and athletes) and students in the Faculty of Physical Education and Sport.

The control comprised employed subjects from different companies and services, and students from different faculties (chemistry, psychology).

We excluded from the analysis those subjects that reported diseases able to bias the results i.e. other organic diseases: diabetes, cancer, endocrine diseases, chronic important alcohol abuse, drugs interfering with gastrointestinal motility or secretion.

Questionnaires

All study subjects received a questionnaire, with multiple sections. The questionnaire consisted of items regarding digestive diseases, demographic characteristics, life, and eating habits, anxiety.

For the diagnostic of the diseases of interest to this study we used the modules of the Rome III criteria: Irritable Bowel Syndrome (IBS) Module, Functional Esophageal Disorders Module.⁹

We assessed anxiety levels with the Zung Self-rating Anxiety Scale (SAS) (22).

We used a non-standardized list of questions to assess demographic data, life and eating habits (e.g. smoking, sleeping problems, eating frequency and diet, physical exercise).

Statistical analysis

Qualitative data was presented with counts and percentages; skewed continuous data was presented with median and quartiles, while normally distributed continuous data was presented with means and standard deviations. Normality of the data was assessed with quantile-quantile plots and Shapiro-Wilk test.

Associations between qualitative variables were assessed with Chi square test, or Fisher exact test. Two groups' comparisons for normally distributed continuous data were made with t-test for independent samples, while for skewed data, the comparisons were made with Wilcoxon rank-sum test.

To assess which factors are likely to be related to the overlap of the two FGIDS made a multiple logistic regression was made. The dependent variable was FED-IBS overlap versus FED or IBS alone. A full model with all the following independent variables was created: the four study groups (instrumentists, vocal singers, sportsmen vs. control), body mass index (BMI), smoking, Zung SAS score, drinking milk, eating legumes, eating bread, eating potatoes, drinking alcohol, drinking coffee. For all models we checked for multicollinearity, misspecification, and component residual plots for functional form. Odds ratios (OR) with their 95% confidence intervals (CI) were presented.

For all statistical tests a two tailed p value was used with a 0.05 level of significance.

All statistical analysis were carried out with the R environment for statistical computing and graphics (R Foundation for Statistical Computing, Vienna, Austria), version 3.2.1 (23).

RESULTS

From the 1600 distributed questionnaires, 1148 (72%) were returned. 137 questionnaires were discarded since incomplete, remaining 1011. From these subjects we retained for further analysis 161 presenting criteria for FED or IBS, which represented our study group. Out of them 23 (14.29%) had FED-IBS overlap, 62 (38.51%) had FED alone, and 76 (47.2%) had IBS alone.

The distribution of subgroups was the following: 45 (27.95%) control subjects, 31 (19.25) singers, 45 (27.95%) instrumentists, and 40 (24.84%) sportsmen.

Characteristics of the respondents

There was no statistically significant difference between the demographic characteristics of the FED-IBS overlap versus FED alone or IBS alone (Table 1). Females were more numerous than males, in all three groups, in the overlap group being the most frequent. The median age, and BMI was similar in all three groups. Instrumentists were more frequent in the FED-IBS overlap group than in FED alone and IBS alone groups (about half as frequent in both groups). Sportsmen, singers and controls were less frequently in the FED-IBS overlap group, than in FED alone and IBS alone groups (with similar frequencies). High education levels were more frequent in the FED-IBS overlap group, than in FED alone and IBS alone groups (with similar frequencies).

Symptoms and subtypes comparisons between FED-IBS overlap and FED or IBS alone

IBS symptoms and IBS subtypes distribution in FED-IBS overlap group and IBS alone group is presented in Table 2. Regarding symptoms the only statistically significant difference was for hard or lumpy stools symptoms which were more intense in the overlap group. Almost all the symptoms scores were higher in the overlap group compared to IBS alone, except for more frequent bowel movements when discomfort or pain started, and loose, mushy or watery stools. Regarding IBS subtypes, we observed statistically significant differences. The IBS with constipation was more frequent in the overlap group, while IBS with diarrhea and unspecified IBS were less frequent in the overlap group.

The comparison of FED subtypes frequencies in FED-IBS overlap with FED alone is presented in Table 3. Functional heartburn was more frequent, and functional dysphagia was less frequent in the overlap group, compared to the FED alone group, the results being statistically significant. Functional chest pain of presumed esophageal origin, and

Table 1. Demographic characteristics of the subjects in FED-IBS overlap, FED alone, and IBS alone.

	FED-IBS overlap (n=23)	FED alone (n=62)	Overlap vs. FED alone P-value	IBS alone (n=70)	Overlap vs. IBS alone P-value
Gender (f/m), n. (%)	17 (73.91) / 6 (26.09)	37 (59.68) / 25 (40.32)	0.226	53 (69.74) / 23 (30.26)	0.7
Age (years), median (IQR)	22 (21 - 34)	21 (20 - 32)	0.414	22 (20 - 25.25)	0.259
BMI (kg/m ²), median (IQR)	22.04 (20.58 - 23.98)	23 (20.29 - 24.79)	0.533	21.34 (19.31 - 23.62)	0.267
Group, n. (%)					
control	5 (21.74)	19 (30.65)	0.07	21 (27.63)	0.094
instrumentist	12 (52.17)	14 (22.58)		19 (25)	
singers	3 (13.04)	13 (20.97)		15 (19.74)	
sportsmen	3 (13.04)	16 (25.81)		21 (27.63)	
Educational levels, n. (%)					
low	0 (0)	2 (3.23)	0.791	3 (3.95)	0.663
middle	14 (60.87)	41 (66.13)		50 (65.79)	
high	9 (39.13)	19 (30.65)		23 (30.26)	

BMI – body mass index (weight in kg/ height in m²), IQR – interquartile range.

Table 2. IBS symptoms and subtypes overlap in symptoms of FED-IBS overlap and IBS alone.

	FED-IBS overlap (n=23)	IBS alone (n=76)	P-value
Symptoms:			
discomfort or pain anywhere in abdomen, mean (SD)	4.17 (0.94)	3.82 (0.89)	0.098
discomfort or pain get better or stop after bowel movement, mean (SD)	2.22 (0.95)	1.91 (1.13)	0.238
when discomfort or pain started, there were more frequent bowel movements, mean (SD)	0.96 (0.98)	1.12 (0.97)	0.484
when discomfort or pain started, there were less frequent bowel movements, mean (SD)	1.26 (1.18)	1.04 (0.99)	0.37
when discomfort or pain started, stools were looser, mean (SD)	1.3 (1.02)	1.09 (1.06)	0.398
when discomfort or pain started, stools were harder, mean (SD)	1.39 (1.03)	1.29 (0.96)	0.663
hard or lumpy stools, mean (SD)	1.7 (1.11)	1.2 (0.98)	0.041
loose, mushy or watery stools, mean (SD)	0.83 (0.78)	1.08 (0.93)	0.241
IBS type, n. (%)			0.03
IBS-C: n (%)	8 (34.78)	11 (14.47)	
IBS-D: n (%)	0 (0)	11 (14.47)	
IBS-M: n (%)	14 (60.87)	43 (56.58)	
IBS-U: n (%)	1 (4.35)	11 (14.47)	

SD – standard deviation, IBS – Irritable Bowel Syndrome (IBS subtypes: C – with constipation, D – with diarrhea, M - mixed, U - unspecified).

Table 3. FED subtypes in symptoms of FED-IBS overlap and FED alone.

Overlap irritable bowel syndrome – functional esophageal disorders:	FED-IBS overlap (n=23)	FED alone (n=62)	P-value
Functional heartburn, n. (%)	18 (78.26)	34 (54.84)	0.049
Functional chest pain of presumed esophageal origin, n. (%)	4 (17.39)	10 (16.13)	1
Functional dysphagia, n. (%)	1 (4.35)	16 (25.81)	0.033
Globus, n. (%)	2 (8.7)	5 (8.06)	1

Factors associated with overlap.

globus were similar in frequency in both groups, with no statistically significant differences observed.

The logistic regression results that assessed factors associated with FED-IBS overlap, compared to FED or IBS alone is presented in Table 4. The model adjusted for all the variables identified two statistically significant factors associated with higher odds of overlap: being instrumentist versus control, and smoking.

Table 4. Factors associated with overlap of symptoms of FED-IBS versus FED or IBS alone.

	OR adjusted	(95% CI)	p
BMI (kg/m ²)	0.96	(0.81 - 1.12)	0.606
Group (instrumentist vs. control)	5.77	(1.22 - 34.83)	0.037
Group (singers vs. control)	1.06	(0.12 - 7.68)	0.953
Group (sportsmen vs. control)	0.5	(0.07 - 3.2)	0.474
Zung SAS score	1.01	(0.97 - 1.07)	0.545
Smoking	9.57	(2.27 - 55.95)	0.005
Alcoholic drinks	0.3	(0.06 - 1.18)	0.102
Coffee	0.24	(0.04 - 1.06)	0.071
Milk	0.44	(0.09 - 2.06)	0.277
Legumes of any kind	5.0e+7	(0 - inf)	0.995
Potatoes	2.2e+6	(0 - 9.9e+191)	0.991
Bread	1.03	(0.15 - 9.16)	0.98

BMI – body mass index (weight in kg/ height in m²), OR – odds ratio, CI – confidence interval, Zung SAS score – Zung Self-rating Anxiety Scale.

DISCUSSION

To our knowledge there are very few studies assessing the overlap of IBS with functional dysphagia, or globus. The majority of the studies that assess the overlap of IBS with FED, focus on functional heartburn. Our study looked into all these relations, and also assessed factors associated with this overlap.

Overlap differences

The comparison between subjects with FED-IBS overlap and IBS alone showed that higher symptoms scores of IBS, especially hard and lumpy stools, corresponding to constipation IBS subtype were more frequent in the overlap group, while unsubtyped IBS was less frequent. Thus, subjects with overlap between IBS and FED to have intense symptoms, similar to findings of other FGIDs overlapping studies,^{10,11} as well as poor quality of life.¹²

When looking into FED subtypes frequencies in FED-IBS overlap group compared with FED alone, those with overlap had more functional heartburn and less functional dysphagia symptoms. Our results are close to those found in a Chinese outpatients study⁴ of IBS – functional heartburn overlap. Another Chinese study in hospitalized patients⁵ found higher percentages of overlap. These differences are normal since both our study and the first mentioned Chinese study, were symptom based studies, while the last Chinese study - excluding the organic diseases could get closer to the truth.

Associated factors

In our study we found a statistically significant association between instrument players and smoking with higher odds of overlap. It is known from the literature that instrument players⁸ have higher odds to have

gastroesophageal reflux disease, and we looked also into heartburn overlapping with IBS.

As any other study, this one has its own limitations. The most important limitation of this study is that we used self-completed questionnaires, not followed by clinical check-up. To prevent this impact on accuracy, we used many exclusion criteria for known organic diseases. As an advantage, we have a large sample of two professions which commonly are rarely investigated.

CONCLUSIONS

FED and IBS are encountered frequently in music and sport performers, both professions submitted to professional stress. Overlap between

FED and IBS may exist also in these categories. Subjects with FED-IBS overlap compared to those without overlap show higher symptoms scores of IBS, more frequent IBS constipation subtype, more frequent functional heartburn and less functional dysphagia symptoms. There were higher odds of overlap in instrument players and in smokers

ACKNOWLEDGEMENTS

None. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

All authors declare no potential conflict of interest related to this article.

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. SN (0000-0001-7396-4394)*: contributed to the study design, collected and performed acquisition of data, interpreted the results, and contributed to the writing of the paper; DCL (0000-0003-4218-8622)*: contributed to the study design, gave the original idea, performed the statistical analysis, and contributed to the writing of the paper; DLD (0000-0001-5404-7662)*: contributed to the study design, interpreted the results, and contributed to the writing of the paper. All authors read and approved the final version of the manuscript. *ORCID (Open Researcher and Contributor ID).

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