

Deployment-Associated Functional Gastrointestinal Disorders: Do We Know the Etiology?

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Functional gastrointestinal disorders (FGD) are a collection of symptoms with no known anatomical or biochemical abnormality [1]. Irritable bowel syndrome (IBS) and dyspepsia are two of the most common types of FGD. The etiology of these disorders is unknown, but speculated mechanisms include altered gastrointestinal motility, visceral hypersensitivity, aberrant brain–gut interaction, food intake, and psychological factors, perhaps with a genetic predisposition [2]. Acute gastrointestinal infection can precipitate or exacerbate the clinical expression of IBS and dyspepsia [3, 4]. Various studies in non-military populations have demonstrated the onset of IBS after gastroenteritis. This type of IBS is known as post-infectious IBS (PI-IBS). The current study makes an association between infective gastroenteritis and subsequent development of FGD in military personnel.

Porter and colleagues conducted a retrospective case–control study to determine whether self-reported diarrhea and/or vomiting and psychological stress during deployment were associated with increased risk of FGD in active-duty military personnel during their first deployment to Iraq and Afghanistan from 2008 to 2009 [5]. Using active-duty military medical encounter data from the Defense Medical Surveillance System, they identified 129 cases (constipation = 67, dyspepsia = 15, IBS = 22, overlapping syndrome = 25) and 396 controls of FGD using ICD-9 codes.

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Reports of diarrhea and vomiting during deployment were obtained from the Post-deployment Health Assessment Survey completed by all military personnel after deployment. Diarrhea during deployment was significantly associated with higher odds of all FGD except dyspepsia. Vomiting during deployment was associated with higher odds of all FGD. Combat and non-combat-related stress was recorded in detail; no association between stress and increased risk of FGD was noted.

The importance of gastrointestinal infection in pathogenesis of IBS is now well recognized. More than 60% of travelers report the onset of diarrhea during travel abroad [6]. Therefore, prevalence of FGD should be high in returned travelers. Development of IBS and dyspepsia after travel abroad has been reported [7–9]. The high prevalence of diarrhea during deployment abroad has also been noticed among military personnel [10]. More than 50% of military personnel developed acute gastroenteritis while on duty in the Gulf during the first Gulf War [11]. Therefore, the positive association between diarrhea and vomiting, a surrogate marker for gastroenteritis, during deployment and subsequent development of FGD is an expected finding.

Certain limitations of the study should be highlighted. The International Classification of Diseases, Ninth Revision (ICD-9) was used to collect cases of FGD in the present study. The potential advantages of using ICD-9 codes in research are that a large number of cases and controls can be collected inexpensively for comparison. The disadvantage is that misdiagnosis of FGD, with no known definite diagnostic marker, is likely to be very high. In one study, only 45% of patients with an ICD-9 diagnosis of IBS met any of the three diagnostic criteria of IBS (Manning, Rome I, or Rome II criteria) [12]. Gastroenteritis was defined as the presence of diarrhea and/or

vomiting. The infective origin of gastroenteritis during deployment was not documented in this study. Both diarrhea and vomiting can be secondary to non-infective causes including psychological stress, common in military personnel [13, 14]. Military personnel with IBS prior to deployment were not excluded, and there is no way to account for patients with gastroenteritis who did not consult for gastroenteritis during deployment. This is an important point because subjects who consult a physician for gastroenteritis are more likely to have IBS [15]. Health-seeking behavior is more common in IBS patients than in control patients.

One of the important findings in this study is the lack of association between acute war-time stress and FGD. A study from Germany reported similar findings: the prevalence of FGD was significantly less during out-of-area missions than during peacetime [16]. Soldiers who were stationed in Croatia on a military mission were much less likely to report IBS and dyspepsia than their counterparts stationed in Germany. These findings suggest that underlying psychological disorders are associated with FGD and that exposure to acute stress may not be a risk factor for FGD.

The results of this study have important implications. Gastrointestinal infection is a known trigger for the onset of FGD. Reducing the incidence of FGD should be the goal of the military. Either prevention or immediate treatment of acute gastroenteritis during deployment may have a role. The target of prevention is difficult as FGD has been reported after bacterial, parasitic, and viral causes of gastroenteritis and due to change in gut flora due to any cause including antibiotic consumption [17]. Deployment of military personnel, similar to long term business travelers, involves not only a change in location but also a change in the physical, social, culture, and biological environment [18]. This involves not only a general adjustment to fit in the new location but adjustment to war-related work. There are stressors of the new location and the war, and lack of social support. Food and diet habits change; sanitation can be an issue. Diarrhea during deployment can be not only infective but may also be secondary to psychological factors. Only a small fraction (7–31%) of individuals who report gastroenteritis go on to develop PI-IBS. Younger age, presence of psychological disorders, and possibly the severity of gastroenteritis are risk factors for PI-IBS [19]. The components of a successful prevention program will remain elusive until more is known about the risk factors of PI-IBS. This process may be hampered, as most patients completely recover after gastroenteritis and many remain undiagnosed.

About a hundred years ago, the British physician Arthur Hurst described some soldiers during World War I who continued to have alternating diarrhea and constipation for

years after recovery from an acute attack of dysentery [20]. Recent studies have demonstrated again that gastroenteritis is associated with a higher risk of developing IBS. The Institute of Medicine report also links deployment to Gulf War and FGD [21]. What is required is a prospective study of military personnel to determine which individuals develop FGD and why they develop FGD after deployment so that effective prevention strategies can be planned. Prevention of a disease not only involves avoidance of the occurrence of the disease, such as risk factor reduction, but also to reduce its consequences once established. The early identification and effective management of FGD among military personnel is required. The results of this study go a long way in highlighting the presence and risk factors of FGD in military personnel.

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