# Service at Wartime and Risk of Inflammatory Bowel Disease Among Military Volunteers


## ABSTRACT

**Objective**: To investigate trends in new onset of inflammatory bowel disease (IBD) among Israel Defense Forces (IDF) volunteers exposed to service during the October 7 conflict.

**Methods**: This retrospective cohort study included 3,477 Israel Defense Forces soldiers who enlisted between 2000 and 2024, had standard medical profiles, developed disqualifying chronic conditions during service, and elected to continue volunteering. Physician-assigned IBD diagnoses were tracked from enlistment through discharge. Hierarchical logistic regression and Cox proportional hazards models assessed the correlation between service during wartime and incident IBD.

**Results**: Out of 3,477 soldiers, 589 (16.9%) were diagnosed with IBD during service. Multivariable logistic regression revealed that service at wartime (OR = 1.71, 95% CI [1.39–2.10], p < .001), female gender (OR = 1.28, 95% CI [1.07–1.54], p = .009), and higher educational attainment (OR = 3.44, 95% CI [1.07–11.04], p = .038) were independently associated with increased odds of incident IBD. Similarly, in the Cox proportional hazards analysis, wartime service was associated with an earlier IBD diagnosis (HR = 1.65, 95% CI [1.37–1.98], p < .001), indicating a higher rate of onset among those serving during these periods.

**Conclusion**: Within this selected cohort of IDF volunteers, service during October 7 was associated with higher odds of incident IBD and earlier diagnosis; however, these preliminary results are hypothesis-generating and do not estimate IBD incidence or prevalence among all soldiers. They may relate to the potential role of acute stress and psychosocial factors during military service.


**Keywords:** Inflammatory bowel disease (IBD), wartime, military service.


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## INTRODUCTION

Inflammatory bowel diseases (IBD), encompassing Crohn's disease (CD) and ulcerative colitis (UC), are chronic inflammatory conditions of the gastrointestinal tract with significant global health implications. Global prevalence in 2019 was approximately 4.9 million cases, with annual prevalence rates varying significantly by region: 10.5-46.14 per 100,000 in Europe, 7.3-30.2 per 100,000 in North America, and 1.37-1.5 per 100,000 in Asia (1). In Israel, IBD prevalence in 2019 was 519 per 100,000 population (0.52%), affecting 46,074 patients nationwide (2).

Military medical classification systems worldwide typically consider IBD patients unfit for standard military service due to deployment limitations, medication requirements, and potential complications during service. However, emerging evidence suggests that individuals with controlled IBD may perform military duties successfully, as demonstrated by a prospective study of 16 Israeli Air Force aviators with IBD who maintained operational flying status over 23 years without adverse safety events (3).

The Israel Defense Forces (IDF) implemented a medical volunteer program allowing individuals with chronic medical conditions, including IBD, to serve if their condition is stable and manageable. This volunteer population consists of two distinct groups: those who enlisted as volunteers due to pre-existing disqualifying medical conditions (such as IBD), and those who were diagnosed with disqualifying conditions (such as IBD) during active military service and subsequently chose to continue serving in a volunteer capacity. The latter group, representing volunteers "from within service", provides a unique opportunity to study disease progression and diagnostic patterns within the military healthcare system.

The relationship between psychological stress and IBD development has been recognized in medical literature. Psychological stress increases disease activity in IBD patients, with adverse life events, chronic stress, and depression significantly increasing relapse likelihood in patients with quiescent disease (4). Studies demonstrate that patients with severe IBD activity experienced significantly more interpersonal trauma and victimization than those with quiescent IBD (5). Approximately one-quarter to one-third of patients with IBD report significant post-traumatic stress symptoms from their disease experiences, and these symptoms are associated with several adverse IBD outcomes (6).

The October 7, 2023, terrorist attacks in Israel and the subsequent war created an unprecedented national trauma with documented widespread psychological impact on the Israeli population. Such massive psychological stressors have been shown in other contexts to accelerate the development and progression of chronic inflammatory conditions, including IBD.

Conventionally, during periods of active military conflict, military medical priorities shift toward acute combat-related injuries and emergency care, with routine medical evaluations and non-urgent diagnostic workups often deferred or deprioritized. However, chronic medical concerns don't become any less pressing during wartime; on the contrary, the significant psychological stress associated with traumatic events may accelerate disease manifestation and exacerbation, potentially leading to more severe symptom presentation that necessitates urgent medical attention and more rapid diagnostic processes.

This study examines the time period from military enlistment to IBD diagnosis among volunteer military personnel serving before and during the October 7 events and subsequent conflict. We hypothesized that despite potential shifts in military medical priorities during wartime, significant psychological stress associated with these traumatic events could accelerate disease development and increase volunteering motivation, resulting in a higher volunteerism rate among IBD patients in the exposed group compared to historical controls.

## METHOD

### Study Design and Population

This retrospective cohort study includes 3,477 Israeli soldiers in sufficient physical and mental health who served in the military and were diagnosed, during their service, with a serious medical condition that necessitated a downgrade of their medical profile to a level deemed unfit for continued military service. However, they all remained in service in a volunteer

capacity (7), and under protected administrative and medical arrangements. Of the 3,477 volunteers, 589 (2.96%) were diagnosed with IBD. The data were obtained from the IDF's computerized database, which includes volunteers' demographic characteristics, military service data, intellectual functioning, and medical diagnoses. The medical records are from January 1, 2000, through December 31, 2024. This cohort included those who were diagnosed with IBD during their service and volunteered to continue it. No exclusion criteria were applied.

This study specifically examined the volunteer population – those who chose to continue service after developing disqualifying conditions – and does not include data on personnel who were diagnosed and discharged without volunteering to continue.

## Ethics

The institutional review board of the IDF Medical Corps approved the study and waived informed consent, citing the need to preserve participants' anonymity [approval number 2495-2025].

## Measures

**Demographic and service-related characteristics** included gender, place of birth (Israel or abroad), religious affiliation (Jewish vs. non-Jewish), and educational attainment (less than 12 years vs. 12 years or more). Socioeconomic status (SES) was determined using residential address data sourced from the Israeli Ministry of Interior. These were classified using a national 10-point SES scale developed by the Israel Central Bureau of Statistics (2006), which ranks municipalities based on socioeconomic indicators. For this study, SES was grouped into three categories: low (scores 1–3), medium (4–6), and high (7–10).

**Military service variables** included whether the individual served in a combat position (yes/no) and their intellectual ability, measured by an intelligence test equivalent to an IQ score. This test comprises four subtests assessing cognitive functioning and yields a score on a 9-point scale ranging from 10 (lowest ability) to 90 (highest), in 10-point increments (Goldberg et al., 2011). For analysis, cognitive scores were classified into three levels: low (10–30), average (40–60), and high (70–90).

## Independent variables

**Wartime Exposure.** Exposure to wartime conditions was defined by military service status during the Israel-Hamas war, which began on October 7, 2023. Participants were classified as unexposed if they had completed their military service by October 6, 2023, thus having no overlap with the wartime period. In contrast, participants were classified as exposed to wartime conditions if they were actively serving in the military at any point on or after October 7, 2023. This definition included both individuals who began their service on or after the outbreak of the war and those who enlisted before the war's outbreak but remained on active duty during the conflict. Accordingly, wartime exposure status reflected actual presence in the military during the wartime period, irrespective of the enlistment date.

## Dependent Variables

IBD. The IDF requires mandatory military service for all 18-year-olds, and conducts comprehensive pre-enlistment medical and psychometric screenings. Family physicians must report any childhood health conditions to military physicians prior to recruitment. This unique system provides an opportunity to examine how pre-existing health conditions interact with military service stressors. Individuals diagnosed with IBD are generally exempt from mandatory military service; however, those who are medically eligible and choose to do so may volunteer for service.

**Statistical analysis**

All statistical analyses were conducted using IBM SPSS Statistics for Windows, Version 29.0. A two-tailed p-value of ≤ .05 was considered statistically significant. Descriptive statistics were calculated to examine the distribution of demographic and service-related variables across the entire cohort. Means and standard deviations were reported for continuous variables, while frequencies and percentages were used for categorical variables. Next, chi-square tests were conducted to explore the degree to which background characteristics and wartime exposure are associated with IBD diagnosis during military service. Logistic regression analysis was used to assess the contribution of wartime exposure and other demographic variables to the likelihood of being diagnosed with IBD. To evaluate the temporal

relationship between wartime exposure and the onset of IBD, a Cox proportional hazards regression was performed. The event was defined as a physician-confirmed IBD diagnosis, and the time variable represented the number of months from enlistment until diagnosis or discharge (end of follow-up). Wartime exposure was the primary predictor. Hazard ratios (HRs) and 95% confidence intervals (CIs) were calculated to estimate the relative risk of IBD incidence associated with exposure to wartime conditions.

## RESULTS

This retrospective cohort includes 3,477 individuals who, despite being deemed unfit for continued military service due to medical conditions identified during their service, voluntarily continued serving. Out of the 3,477 participants, 589 (16.9 %) were diagnosed with IBD during service and subsequently volunteered to continue. Of these, 433 (73.5 %) were diagnosed before October 7, 2023 (pre war period), and 156 (26.5 %) during or after that date.

As presented in Table 1, several significant differences emerged between participants diagnosed with IBD during military service and those without such a diagnosis. Gender was significantly associated with IBD status, with a higher proportion of female participants among IBD cases compared to non-cases (19.3% vs. 15.7%; $\chi^2 = 6.94$, $p = .008$). Educational attainment was also associated with IBD, in that individuals with 12 or more years of education were more likely to be

| | Non IBD $n = 2,888$(%) | IBD $n = 589$(%) | $\chi^2$ | p-value |
|---|---|---|---|---|
| **Gender** | | | | |
| Male | 1,933 (84.3) | 361 (15.7) | 6.937** | 0.008 |
| Female | 955 (80.7) | 228 (19.3) | | |
| **Religion** | | | | |
| Jewish | 2,840 (82.9) | 584 (17.1) | 2.155 | .142 |
| Other | 48 (90.6) | 5 (9.4) | | |
| **Years of Education** | | | | |
| ≤12 | 58 (95.1) | 3 (4.9) | 6.378* | .012 |
| 12 or more | 2,830 (82.8) | 586 (17.2) | | |
| **IQ** | | | | |
| Low | 309 (93.1) | 23 (6.9) | | |
| Medium | 1,433 (84.5) | 262 (15.5) | 43.699*** | <.001 |
| High | 1,139 (78.9) | 304 (21.1) | | |
| **Socioeconomic Status** | | | | |
| Low | 170 (78.3) | 47 (21.7) | | |
| Medium | 623 (84.4) | 115 (15.6) | 4.411 | .110 |
| High | 2,014 (83.1) | 409 (16.9) | | |
| **Service During War** | | | | |
| Yes | 500 (76.2) | 156 (23.8) | 26.890*** | <.001 |
| No | 2,388 (84.7) | 433 (15.3) | | |
| **Combatant** | | | | |
| Yes | 235 (80.8) | 56 (19.2) | 0.914 | 0.339 |
| No | 2,396 (83.0) | 486 (17.0) | | |

***Note***: *$p$<.05, **$p$<.01, ***$p$<.001.

**Table 1** - Background and service-related variables by IBD in volunteers (N = 3,477).

diagnosed compared to those with less than 12 years (17.2% vs. 4.9%; $\chi^2 = 6.38$, $p = .012$).

Cognitive ability, as measured by pre-service IQ scores, was strongly and significantly associated with IBD diagnosis. Participants in the high IQ category had a notably higher prevalence of IBD compared to those in the low category (21.1% vs. 6.9%; $\chi^2 = 43.70$, $p < .001$). Socioeconomic status showed a non-significant trend, with no statistically significant differences across SES levels ($\chi^2 = 4.41$, $p = .110$).

Exposure to wartime conditions (the primary independent variable of the study) was significantly associated with IBD incidence among IDF volunteers: 23.8% of those who served during the war and chose to volunteer to military service were diagnosed with IBD, compared to 15.3% among those who did not serve during that time ($\chi^2 = 26.89$, $p < .001$). In contrast, no significant group differences were found with respect to religion (Jewish vs. other; $\chi^2 = 2.16$, $p = .142$) or combatant status ($\chi^2 = 0.91$, $p = .339$).

A multivariable logistic regression analysis was conducted to identify independent predictors of IBD incidence among volunteers during military service (see Table 2). The model revealed that exposure to wartime conditions was significantly associated with an increased likelihood of volunteers' diagnosis with IBD during service, even after adjusting for relevant sociodemographic variables. Specifically, participants who were exposed to wartime conditions had 1.71 times greater odds of IBD onset compared to their unexposed counterparts (OR = 1.71, 95 % CI [1.39, 2.10], $p < .001$).

In addition to wartime exposure, two other variables emerged as significant independent predictors. Female volunteers had higher odds of volunteering for service after a new IBD diagnosis than males (OR = 1.28, 95% CI [1.07, 1.54], $p = .009$). Moreover, individuals with more years of formal education were also at elevated risk, with each additional year of education associated with a more than threefold increase in the incidence of IBD diagnosis (OR = 3.44, 95 % CI [1.07, 11.04], $p = .038$).

Figure 1 illustrates the hazard function for time to IBD diagnosis, stratified by wartime exposure. As shown, the cumulative hazard curve for participants exposed to the October 7 war was markedly steeper, indicating both earlier and more frequent IBD diagnoses in this subgroup. To formally assess this correlation, a Cox proportional hazards regression analysis was performed. Results indicated that wartime exposure was a significant predictor of time to IBD diagnosis (in volunteer subgroup), with exposed individuals exhibiting a 65% increased hazard compared to unexposed individuals (HR = 1.65, 95% CI [1.37, 1.98], $p < .001$).

## DISCUSSION

This study is among the first to examine the association between service during wartime and IBD diagnosis among volunteers to military service, suggesting a potential role of acute psychological trauma in triggering diseases such as IBD. The observed association aligns with established research showing that psychological stress increases disease activity in IBD patients, with adverse life events significantly increasing relapse likelihood (4). The collective nature of the October 7

| Predictor | B | OR | 95% CI | p-value |
|---|---|---|---|---|
| Gender (Female) | 0.247 | 1.280** | 1.065-1.538 | 0.009 |
| Education | 1.236 | 3.442* | 1.073-11,044 | .038 |
| Wartime Exposure | 0.534 | 1.707*** | 1.387-2.100 | <.001 |

***Note***: *$p$<.05, **$p$<.01, ***$p$<.001.

**Table 2** - Multivariate logistic regression predicting onset of IBD during military service in volunteers.

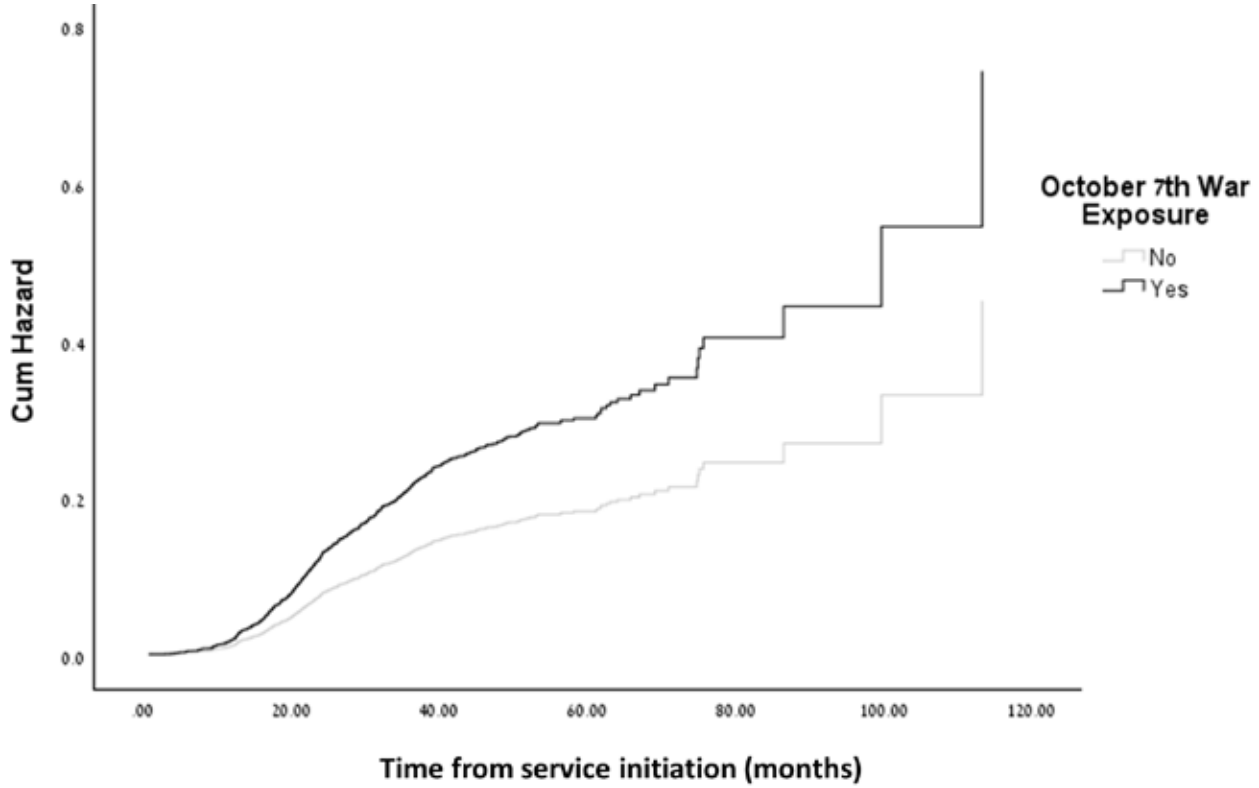


**Figure 1** - Hazard Function to volunteer with IBD Over Time Among IDF volunteers.

trauma, affecting the entire Israeli population, created unprecedented psychological stress, which likely contributed to both accelerated IBD development in genetically predisposed individuals and increased volunteering rates due to increased motivation and national needs.

Our findings reveal important demographic patterns. Female volunteers demonstrated increased IBD incidence, consistent with epidemiological data showing higher IBD prevalence among women in certain populations. Additionally, volunteers diagnosed with IBD had notably higher educational attainment, which may reflect greater health awareness and more proactive healthcare-seeking behavior.

The study period witnessed increased volunteerism among IBD patients following the October 7 events. This phenomenon likely reflects heightened national solidarity and motivation to serve during wartime, potentially encouraging individuals with chronic conditions to volunteer despite their health status. Additionally, over the years, the military has improved its ability to identify which volunteers with chronic conditions are suitable for service and likely to remain medically stable.

From a healthcare policy perspective, these results underscore the critical importance of maintaining routine medical services during emergencies. The understanding that emergency situations significantly impact routine healthcare utilization and disease patterns cannot be ignored in healthcare planning. Military and civilian healthcare systems must recognize that the indirect health effects of crisis situations may be as significant as the direct effects, requiring sustained investment in routine diagnostic and therapeutic services even when resources are stretched.

## Limitations

This study has several important limitations. The cohort included only individuals diagnosed with a chronic illness who subsequently volunteered to continue military service, representing a select subgroup that may not reflect the broader population of IBD cases.

These individuals may differ systematically from those discharged earlier, particularly in resilience, health-seeking behavior, and medical follow-up, which could introduce selection and detection biases. Notably, the proportion of volunteers was higher following the October 7, 2023, events, raising the possibility that the observed increase in diagnoses during the post-war period may partly reflect enhanced motivation to serve, increased medical oversight, or longer follow-up time, rather than a true rise in new IBD cases. Although wartime exposure remained significantly associated with IBD diagnosis in multivariable models, these findings should be interpreted with caution. Further research involving broader military and civilian populations, including individuals who did not remain in service, is warranted in order to clarify the extent to which the association reflects underlying biological effects versus systemic or behavioral factors.

Additionally, we lacked detailed service data, including combat versus support roles, unit type, deployment duration, and specific exposure characteristics, preventing subgroup analyses that could help identify high-risk populations or specific stressors. We also cannot assess IBD incidence or prevalence in the general IDF population, as our data are limited to this volunteer cohort. This is a signal-generating study that requires validation in broader military and civilian populations before drawing general conclusions about wartime stress and IBD risk.

## Conclusions

In this retrospective study of a cohort of volunteer personnel who developed chronic illness during service and volunteered to continue, exposure to the October 7, 2023, war was significantly associated with an increased likelihood of volunteering with Inflammatory Bowel Disease. This association persisted after adjustment for key demographic and service-related factors. However, the interpretation of these findings must account for the selective nature of the volunteer cohort, particularly given the higher proportion of volunteers in the post-war period, which may have contributed to both increased detection and follow-up. While these results raise important questions about the potential impact of acute wartime stress on IBD onset, they also highlight the need for further studies in more representative populations, in order to disentangle biological effects from systemic and behavioral influences.

## Acknowledgment

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