Disproportionate Increase in Cancer Incidence Among Adults Aged 30-50 Years During the COVID-19 Pandemic Period: A Community-Based Cohort Analysis and Potential Mechanistic Implications

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ABSTRACT

This study investigates how cancer incidence changed before and after the COVID-19 pandemic in a South Carolina community oncology clinic, focusing on age differences. Comparing data from 2016–2019 to 2020–2024, researchers found a notable 25.5% rise in cancer cases among adults aged 30–50, which accounted for over three-quarters of the total increase. Specifically, cancer rates rose 24.5% in the 30–40 age group and 25.9% in the 40–50 group, while changes in younger (0–30) and older (>50) groups were minimal.

These findings suggest that the pandemic may have contributed to a surge in cancer among middle-aged adults, potentially due to factors like chronic stress, lifestyle changes, delayed healthcare, and persistent effects of COVID-19 infection, such as long-term inflammation. The authors call for broader studies to explore these trends and inform cancer prevention and monitoring efforts.

INTRODUCTION

The COVID-19 pandemic has caused major disruptions in public health that extend beyond the direct effects of SARS-CoV-2 infection [1–3]. While initial studies focused on delays in cancer screening and diagnosis during the pandemic [4,5], newer research suggests more complex changes in cancer risk across certain population groups [6–8]. According to the National Cancer Institute, overall cancer diagnoses dropped by 10% in 2020, with only partial recovery afterward [9,10].

A particularly troubling trend is the increasing incidence of cancer among adults under 50, which may have been accelerated by the pandemic [11–13]. This rise includes cancers such as colorectal, breast, pancreatic, and kidney [14–16], and is thought to be influenced by factors like the obesity epidemic, environmental exposures, and lifestyle changes, although the exact mechanisms remain uncertain [17–19].

POTENTIAL MECHANISMS LINKING COVID-19 TO CANCER RISK

There is growing scientific interest in how COVID-19 may increase cancer risk through several interconnected mechanisms:

Chronic Inflammation and Immune Dysregulation:

Long COVID, affecting an estimated 10–30% of those infected, involves persistent systemic inflammation [20–22]. Chronic inflammation is a known contributor to cancer development via DNA damage, cell cycle disruption, and impaired immune surveillance [23–25]. Elevated markers like IL-6, TNF-α, and CRP have been detected months after infection in Long COVID patients [26–28].

Stress-Induced Carcinogenesis:

The pandemic caused significant psychological and social stress, especially among working-age adults facing economic and caregiving pressures [29–31]. Chronic stress is linked to cancer through immune suppression, hormonal imbalance, and behavioral changes [32–34], with disruption of the hypothalamic-pituitary-adrenal axis potentially promoting tumor growth and spread [35–37].

Healthcare System Disruptions:

Widespread delays in cancer screening and routine care, particularly early in the pandemic, may have led to more advanced cancer diagnoses [38–40]. Screening rates for breast and cervical cancer, for example, fell by 87% and 84% respectively in April 2020 [41,42].

Lifestyle and Environmental Factors:

Pandemic-related lifestyle changes—such as reduced physical activity, poor diet, increased alcohol use, and social isolation—are all established cancer risk factors [43–45]. These changes may have been more pronounced in working-age adults due to remote work, school closures, and prolonged social restrictions [46–48].

METHODS

This retrospective cohort study analyzed cancer incidence data from a diverse patient population at a South Carolina cancer clinic between January 1, 2016, and December 31, 2024. Data were classified using ICD-O-3 and grouped into four age categories. The study compared two periods: pre-pandemic (2016–2019) and pandemic/post-pandemic (2020–2024). Descriptive statistics and percentage changes in cancer incidence were calculated, and chi-square tests assessed significance ($p < 0.05$). A literature review was also conducted using PubMed, EMBASE, and Google Scholar, focusing on COVID-19, Long COVID, cancer risk, inflammation, and pandemic-related lifestyle changes.

RESULTS

The study analyzed 3,477 cancer cases—1,713 pre-pandemic (2016–2019) and 1,764 during the pandemic/post-pandemic period (2020–2024).

Key Findings by Age Group:

- Ages 0–30: Minimal change (+5.9%, $p = 0.78$).
- Ages 30–40: Significant increase (+24.5%, $p = 0.02$).
- Ages 40–50: Largest absolute increase (+25.9%, $p < 0.001$).
- Ages >50: Stable (+0.6%, $p = 0.61$).

Combined 30–50 Age Group:

- Saw a 25.5% increase in cancer cases ($p < 0.001$), accounting for 78.4% of the total case increase, despite making up only 9.2% of pre-pandemic cases.

National Comparison:

- Unlike national trends showing a temporary 10% drop in diagnoses in 2020, this study found a persistent increase in cancer incidence in adults aged 30–50 through 2024, suggesting causes beyond delayed diagnosis.

DISCUSSION

The study found a significant 25.5% increase in cancer incidence among adults aged 30–50 during the pandemic, unlike other age groups. This rise likely goes beyond delayed diagnoses and suggests ongoing risk factors.

Possible causes include:

Chronic inflammation and immune changes from SARS-CoV-2 infection and Long COVID.

Pandemic-related chronic stress affecting immune function and behaviors.

Lifestyle shifts such as poorer diet, less exercise, and increased substance use.

Disruption of the microbiome impacting cancer risk.

Clinical implications:

Increased cancer vigilance and risk assessment in adults 30–50.

Potential updates to screening and emphasis on lifestyle counseling.

Research priorities:

Larger, multi-center studies to confirm findings and identify cancer types.

Mechanistic and intervention research.

Attention to health disparities.

Limitations:

Single-center data, no cancer-type specifics, potential confounding factors, and limited follow-up.

CONCLUSIONS

The study reveals a significant 25.5% rise in cancer incidence among adults aged 30–50 during the COVID-19 pandemic, while other age groups remained stable. This suggests age-specific risk factors likely driven by a combination of SARS-CoV-2-related chronic inflammation, pandemic stress, lifestyle changes, and healthcare disruptions.

If confirmed in larger studies, this trend poses serious public health concerns due to its impact on the economically vital working-age population. The findings highlight the urgent need for:

Large-scale validation studies

Enhanced cancer surveillance in this age group

Research into underlying biological mechanisms

Development of targeted prevention and intervention strategies

Long-term monitoring of cancer trends

This emerging pattern may require significant shifts in cancer prevention, screening, and care to address the pandemic's lasting effects on cancer burden. Immediate action is critical.

REFERENCES

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