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Effects of the COVID-19 Pandemic on the Health of American Indians

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Abstract

COVID-19 has been most devastating to the elderly and those living in dense communities, which disproportionately affects American Indians as they are medically underserved. American Indians tend to live in multigenerational housing which puts them at higher risk for transmission of COVID-19. To determine other risk factors and the long-term physical and mental health impacts of COVID-19 on American Indians, a literature review was completed using meta-analyses and case studies.

The results of this study confirm that age is the most substantial risk factor for severe COVID-19 illness, complication, and mortality, regardless of race or ethnicity. However, American Indians are 3.5 times more likely to contract COVID-19 and almost twice as likely to die compared to Caucasian Americans. American Indians under 60 had significantly higher mortality rates than Caucasian Americans, as well. Overcrowding in multigenerational housing, as well as the higher prevalence of comorbidities in American Indians, correlates with more significant COVID-19 illness burden and mortality. Historical trauma and racial and structural inequalities, considered adverse life events, contribute to chronic disease vulnerabilities, like cardiovascular disease, diabetes, and chronic respiratory disease, which also correlate with higher morbidity and mortality from COVID-19.

Keywords: American Indians; Native Americans; American natives; Indians, North America; indigenous; COVID-19; coronavirus; SARS-CoV-2

Introduction

Dikos Ntsaaigii-Náhást'éíts'áadah is the Navajo term (Kakol, Upson, & Sood, 2020) for coronavirus disease 2019, more commonly known as COVID-19. The pandemic began in December 2019 and is a respiratory disease that causes severe acute respiratory syndrome (SARS). The elderly or those with other comorbid conditions tend to have greater disease severity and adverse outcomes (Centers for Disease Control and Prevention, 2021). Because COVID-19 is highly transmissible, social distancing and lockdowns helped slow the infection rate so scientists could learn more about preventing and controlling the virus (Fauci, Lane, & Redfield, 2020).

Those living in dense communities were particularly affected by COVID-19 due to the inability to maintain social distancing or isolation with known infections. Often, these communities cannot efficiently diagnose or treat COVID-19 infections and their sequelae (Velavan & Meyer, 2020). In the United States, 5.2 million people identify as American Indian or Alaska Natives (US Census Bureau, 2012), and many of these live in multigenerational housing and dense communities. This literature review explores the risk factors that put American Indians at higher risk for contracting COVID-19 and the long-term physical and mental health implications of COVID-19 for this population.

Statement of the Problem

The COVID-19 pandemic has been particularly devastating for indigenous populations; they have suffered greater mortality rates from the pandemic than the majority population. The purpose of this literature review is to investigate the risk factors and long-term physical and mental health consequences that American Indians face with COVID-19. What puts American Indians at higher risk for contracting COVID-19? Is it physiological, cultural, or is it due to

healthcare disparities? Additionally, it is crucial to know the long-lasting implications affecting physical and mental health. Finally, understanding why COVID-19 has disproportionately impacted the American Indian population will help healthcare providers tailor the approach in best serving their healthcare needs.

Research Question

What are the risk factors and long-term physical and mental health consequences that American Indians face with COVID-19?

Methods

The literature review searched PubMed, PsycINFO, EBSCO, CINAHL, Embase, and DynaMed. Keywords and MeSH terms helped define a set of the literature discussing COVID-19 and American Indians. In addition, mental health, physical health, long-term outcomes, and prognosis increased the specificity to match this study. The search revealed 294 studies; several were commentaries and opinions from healthcare providers and therefore were excluded. The final nine studies included in this literature review were meta-analyses, surveys, and case studies from providers caring for COVID-19 positive patients.

Keywords: American Indians; Native Americans; American natives; Indians, North American; indigenous; COVID-19; coronavirus; SARS-CoV-2

Literature Review

Note: Language identifying the population (American Indians) in this literature review is consistent with the language used in each study. In the portions written by this author, American Indian will be the preferred terminology.

Statistics from the COVID-19 Pandemic

COVID-19 was first noted in Wuhan, China, and was declared a global pandemic on March 11, 2020 (Centers for Disease Control and Prevention, 2021). COVID-19 is caused by the

coronavirus SARS-CoV-2 which targets the alveoli of the lungs and results in an acute

respiratory disease spread by close contact with respiratory droplets. Coronaviruses are large,

enveloped viruses that can cause the common cold in humans and animals; they were first

described in scientific literature in 1966 (Velavan & Meyer, 2020).

The reproduction rate of COVID-19 is 2.2, meaning that one ill person can infect more

than two people (Fauci, Lane, & Redfield, 2020). The median incubation time is four to five days

from exposure to symptom onset, though symptoms can occur up to 14 days after exposure. Of

those individuals who experience symptoms, 97.5% will do so within 11.5 days. Symptoms can

vary and include any combination of the following: shortness of breath, loss of sense of smell or

taste, fever, chills, cough, headache, congestion, rhinorrhea, nausea, vomiting, and diarrhea.

Approximately 20% of symptomatic people also suffered dermatologic manifestations, including

hives, maculopapular rash, and lesions that cause discoloration of fingers and toes. Up to 30% of

people infected with COVID-19 are asymptomatic (Centers for Disease Control and Prevention,

2021). In a study completed in China of 44,000 COVID-19 positive participants, 81%

experienced mild to moderate symptoms and 14% experienced severe symptoms, including

hypoxia and dyspnea. The final five percent were considered critical and experienced respiratory

failure, shock, or multi-system dysfunction; all deaths from this study occurred in this population

(Centers for Disease Control and Prevention, 2021).

As of February 2020, COVID-19 had a worldwide mortality rate of 2.2%, with mortality

resulting from multi-system inflammatory reactions. Chronic metabolic comorbidities can cause

more adverse outcomes (Bentley, 2020; Velavan & Meyer, 2020). Mortality is variable and

associated with advanced age, severe disease, and comorbidities; for all patients, the death rate is

0.3 to 2.3%, but for those requiring mechanical ventilation, mortality is 37 to 88% (DynaMed, 2020).

The most recent data, released on June 6, 2021, showed 172 million infections and 3.7 million deaths worldwide and counting (DynaMed, 2020). The median age of those infected with COVID-19 was 59 with 56% of patients being male (Fauci, Lane, & Redfield, 2020).

Risk Factors for American Indians and COVID-19

Age is the most substantial risk factor for severe COVID-19 illness, complication, and mortality, regardless of race or ethnicity (Centers for Disease Control and Prevention, 2021; Fauci, Lane, & Redfield, 2020). For those over 80, mortality is 14.8% and drops dramatically for each prior decade of life. For those 70-79, 60-69, and 50-59, the mortality rates are 8%, 3.6%, and 1.3%, respectively. This drops to 0.4% in those 40-49 and 0.2% for those under 40 (Centers for Disease Control and Prevention, 2021).

The risk of severe COVID-19 infections can also be increased due to comorbid conditions: 10.5% with cardiovascular disease, 7.3% with diabetes mellitus, 6.3% with chronic respiratory disease, and 5.6% with cancer. Other health conditions associated with more severe illness or adverse outcomes included those with chronic kidney disease, congestive heart failure, pulmonary hypertension, or a history of stroke (Bentley, 2020; Centers for Disease Control and Prevention, 2021).

The 2010 United States census showed more than 5.2 million people (0.9%) identified as American Indian or Alaska Native (AIAN) (US Census Bureau, 2012). Until recently, AIAN were considered "other" in the census, making population estimations difficult and inaccurate. American Indians have been disproportionately affected by COVID-19 and three studies investigated the risk factors that make them more susceptible to infection and severe illness.

Hatcher et al. (2020) gathered COVID-19 data from the CDC's National Notifiable Surveillance System; from January 31, 2020 to July 3, 2020, Non-Hispanic American Indians and Alaska Natives (NHAIAN) accounted for 0.7% of the population, but 1.3% of COVID-19 cases. The COVID-19 incidence rate in NHAIAN was 3.5 times higher than Non-Hispanic Whites (NHW); NHAIAN incidence was 594 per 100,000 people compared to 169 per 100,000 for NHW. Furthermore, COVID-19 tends to affect younger NHAIAN than NHW: the median age of NHAIAN was 40, compared to 51 for NHW. Additionally, there was a higher proportion (12.9%) of NHAIAN affected under the age of 18 compared to NHW (4.3%) (Hatcher et al., 2020).

The differences between populations are due to the structural inequality that faces NHAIAN: they often work in 'essential' businesses, such as restaurants and grocery or convenience stores, and rely on public transportation, putting them at higher risk for transmission. The often live in multigenerational housing with incomplete plumbing or limited access to clean water, which makes physical distancing and hand hygiene more difficult. Finally, NHAIAN are more likely to suffer from comorbid conditions that increase their likelihood of severe COVID-19 complications (Hatcher et al., 2020).

While the COVID-19 data is reliable in this study, reporting of demographics for these cases is voluntary. Less than half of the United States (23 states) reported demographics on more than 70% of their COVID-19 cases, leading to 26.3% of cases having complete demographics. Additionally, data regarding comorbid conditions and COVID-19 symptoms were more likely to be complete in COVID-19 cases of NHW than in NHAIAN. Comorbid conditions were complete for 8.4% of NHAIAN and 27.3% of NHW, while COVID-19 symptoms were complete for 11% of NHAIAN and 28.2% of NHW. Furthermore, data from Arizona was excluded due to greater

than 30% of cases missing demographic information, despite Arizona accounting for more than

one-third of American Indian COVID-19 cases (Hatcher, et al., 2020).

Next, Bentley (2020) hypothesized that allostatic load, or adverse life events, can

prematurely age individuals biologically and contribute to vulnerability to chronic disease, as

well as COVID-19. Allostatic load correlates with telomere length, which measures epigenetic

age and shows that ethnic minorities appear to have a higher biological age than their

chronological age.

For American Indian and Alaska Natives (AIAN), historical trauma, racial inequality, and

structural inequalities, such as limited access to healthcare, contribute significantly to health care

disparities and likely contribute to the increased COVID-19 incidence in this population

(Hatcher, et. al., 2020). Bentley (2020) states that AIAN have had twice as many individuals

hospitalized than are proportionally represented in the United States and have a higher morbidity

and mortality rate when compared with Caucasian Americans.

Socioeconomic factors that increase the susceptibility of COVID-19 infections include

food insecurity or lack of access to healthy food, green space, gyms or parks, and healthcare

services or insurance (Bentley, 2020). Furthermore, regions where minorities live are typically

more polluted than areas where Caucasian Americans live, increasing chronic disease load. In

addition, exposure through employment, whether being an essential worker or being unable to

work from home, increases the risk for COVID-19 infections (Bentley, 2020).

Kakol, Upson, & Sood (2020) had two different theories regarding health risks for

American Indians: historical and etiologic. The historical perspective investigates the

relationship between immunity and colonization. American Indians before 1492 rarely

encountered new diseases, but the landing of Christopher Columbus brought a surge of disease

that caused devastating population losses. During the1918 Influenza pandemic, American

Indians had a two percent mortality rate, a 24% infection rate, and had the highest death rate of

any racial or ethnic group in the United States. Sin Nombre Hantavirus caused a viral illness in

the 1990s in Navajo Nation that had a mortality rate of 75%. Furthermore, during the 2009 H1N1

influenza A outbreak, American Indians had a mortality rate four times higher than all other

ethnic groups within the United States combined. Today's American Indians retain similar

genetics to their pre-Columbian ancestors, meaning their innate immunity is inadequate which

makes them more susceptible to viral infections. American Indians also tend to have less genetic

variability, therefore, their innate immunity is likely to remain inadequate.

The etiologic theory combines socioeconomic risk factors with comorbidities. Many

American Indians experience poverty and live in multigenerational housing, which is often

overcrowded; additionally many homes on tribal reservations lack complete indoor plumbing.

Access to healthcare providers and access to healthy foods are far from adequate. American

Indians experience age-adjusted mortality that exceeds the general US population by 40%, due to

a combination of heart disease, cancer, unintentional injuries, or diabetes mellitus (Kakol,

Upson, & Sood, 2020). American Indians also experience a higher prevalence of obesity,

cardiovascular disease, and smoking than the general US population; all of these are risk factors

for more significant COVID-19 illness burden and mortality (Kakol, Upson, & Sood, 2020).

Kakol, Upson, & Sood (2020) used the Behavioral Risk Factor Surveillance System

(2018) to estimate the proportion of individuals who have more than one risk factor for severe

COVID-19 illness, as determined by the Centers for Disease Control and Prevention. The

authors then classified the data by age, race or ethnicity, and household income. Data were

available from 387,304 individuals for race or ethnicity and 336,861 individuals for household income.

Results indicated that more than 97 million Americans (43% of the population of the United States) had a higher risk of contracting COVID-19, with 25 million Americans living in low-income housing. American Indians under 65 had a 42% risk for severe COVID-19 illness, compared to 28% for Caucasians of the same age. Eighteen percent of American Indians under 65 years had two or more risk factors compared to only eight percent for the same age group of Caucasians. For those over 65 years, the statistics jumped to 69% of American Indian adults and 54% of Caucasians (Kakol, Upson, & Sood, 2020).

This data should be approached cautiously, as the Behavioral Risk Factor Surveillance System is self-reported; participants can choose what health information to disclose and some may not be aware of health conditions they have.

In another study, Hathaway (2020) investigated social factors that affected American Indians and Alaska Natives (AIAN) using the Social Vulnerability Index. The Agency for Toxic Substances and Disease created the Social Vulnerability Index (SVI) to identify communities that may need support for traumatic events. This tracks a variety of factors that can increase the risk for these communities including:

- socioeconomic factors, such as how many households live below the poverty level, have no high school diploma, and per capita income

- minority status and language

- housing type, including mobile homes and overcrowding

- transportation

- household composition and disability, including those aged under 17 years and

over 65 years, those over five with disabilities, and single-parent households

COVID-19 data was collected from tribes, which voluntarily report cases; this showed

30,419 positive cases as of July 26, 2020. These tribes experience higher rates of poverty,

unemployment, and have a lower per capita income compared to the American average.

American Indian poverty rates range from 19.2% to 40.2% on Navajo Nation, compared to the

average American poverty rate of 15.6%. The average unemployment rate for American Indians

is 11.2% to 26.9% compared to 5.8% American average. The average per capita income for

AIAN ranges from $12,117 to 26,570 on Navajo Nation whereas the average per capita income

for the general population $27,036 (Hathaway, 2020).

Additionally, these tribal regions suffered in all categories regarding housing when

compared to the American average: they had a higher percentage of mobile homes (9.7% to

23.1% compared to 12.9%) and a higher percentage of occupied units with more people than

bedrooms (3.4% to 17.4% compared to 2.4%). This data showed a higher percentage of

uninsured American Indian residents (14.9% to 26.7% compared to 10.1%) and a higher

percentage of single-parent households (11.3% to 19.5% compared to 8.3%) (Hathaway, 2020).

Lastly, Yellow Horse, Yang, & Huyser (2020) investigated the relationship between

structural inequalities before the pandemic and the number of confirmed COVID-19 cases. They

deemed this as concentrated disadvantage. The authors wanted to determine the association

between the density of the Native American population per zip code and the number of

confirmed COVID-19 cases in Arizona. Arizona was chosen as it has the largest population of

Native Americans (11.4%) and the greatest number of federally recognized tribes (22) in the

United States (Yellow Horse, Yang, & Huyser, 2020).

The 2014-2018 American Community Survey was used to determine the racial and ethnic populations of each zip code and to estimate structural inequalities. This included the percentage of people living in poverty and receiving public assistance, median income, unemployment rate, female single-parent households, and the population that holds less than a high school degree. Other variables in their study included the percent of the population 65 years and older, those without insurance coverage, overcrowded housing, housing without complete plumbing, those who used public transportation to commute, and English-speaking households (Yellow Horse, Yang, & Huyser, 2020).

Geographically weighted regression was used to determine the zip codes where COVID-19 infection clusters were located. Preliminary data showed an average population of 18,325 residents per zip code with 21% being over the age of 65, 16% uninsured residents, and 11% identifying as Native American. Each zip code averaged 33 positive COVID-19 infections.

Native Americans comprised 4.6% of the total population of Arizona but accounted for 12% of positive COVID-19 cases and 16% of COVID-19 deaths, as of May 2020. Navajo Nation, which covers more than 17 million acres in Arizona, New Mexico, and Utah, had the highest cases of COVID-19 per capita, even compared to New York and New Jersey. Navajo Nation's COVID-19 cases numbered 1,786 per 100,000 people while New York and New Jersey had 1,751 and 1,560 per 100,000 people, respectively (Yellow Horse, Yang, & Huyser, 2020).

The authors showed that concentrated disadvantage was strongly correlated to denser populations of American Indians per zip code, percentage of overcrowded housing, and incomplete plumbing facilities. Higher percentages of individuals commuting on public transportation also correlated with higher rates of COVID-19 infection (Yellow Horse, Yang, & Huyser, 2020).

Collecting data proved challenging because counties reported their COVID-19 data differently: some reported cases as 'one to five' cases per zip code while others reported exact numbers. Secondly, in zip codes where Native Americans comprised more than half the population, data was suppressed; these areas were in Navajo Nation and data there is voluntarily reported by the tribe. It should be noted that this data accounts for only those Native Americans living on tribal land, which is 47% of Navajo Nation's citizens (Yellow Horse, Yang, & Huyser, 2020).

COVID-19 Infection and Long-Term Physical Health Effects on American Indians

There were three studies investigating the long-term physical health effects of COVID-19, including infection rates, mortality, and neurological symptoms.

In the first study, Arrazola et al. (2020) used data collected by the CDC, state health departments, case investigations, death certificates, and laboratory reports from January 1, 2020 to June 30, 2020 to determine COVID-19 infection and mortality rates. Epidemiologists and tribal epidemiology experts specifically investigated the case and mortality rates of American Indian and Alaska Natives (AIAN) compared to non-Hispanic whites (NHW). There were 1,134 COVID-19 deaths among AIAN compared to 18,815 deaths among NHW; just over half were male (52-55%). COVID-19 mortality rates increased with age in all racial and ethnic groups, with the most significant disparity in the 20-49-year-old group. In 20–29-year-olds, NHAIAN COVID-19 mortality rates were 10.5 times higher than NHW. For 30-39 years and 40-49 years, it was 11.6 times and 8.2 times higher for AIAN than for NHW, respectively (Arrazola et al., 2020).

As of December 2020, there had been 2,689 AIAN deaths due to COVID-19 in the United States; this data was from 14 states, as these were the only states reporting racial and

ethnic demographics. At that time, the case rate was 3.5 times higher for AIAN than for NHW, and the age-adjusted mortality rate for COVID-19 was 1.8 times higher for AIAN (Arrazola et al., 2020).

Those AIAN who died due to COVID-19 were younger overall than NHW who died; 35.1% of AIAN deaths were 60 years of age or younger, while only 6.3% of NHW deaths were under the age of 60. Men suffered higher mortality rates for both AIAN and NHW, 66.4 and 36.1 deaths per 100,000 people, compared to women at 46.8 and 25.4, respectively. The highest mortality rates for all racial and ethnic groups were among those over 80 years of age (Arrazola et al., 2020).

This study compared AIAN to NHW and did not include measures on other racial and ethnic groups. Additionally, the COVID-19 infection rates drastically increased during this study, causing shortages of testing supplies, so infections and deaths were likely underreported (Arrazola et al., 2020).

Next, Bassett, Chen, & Krieger (2020) performed a cross-sectional study from February 1, 2020 to July 22, 2020 using US Census and reported COVID-19 data. The population of non-Hispanic American Indian and Alaska Natives (NHAIAN) was 19.5 million, with 1,143 deaths from COVID-19 (5.8%). Comparatively, the non-Hispanic white (NHW) population was 186.4 million, with 68,377 deaths (3.6%).

The data showed greater mortality risk from COVID-19 at all ages for NHAIAN than for NHW so the authors compared age-specific mortality from COVID-19 for NHAIAN and NHW. Before age 65, the mortality rate for NHAIAN was 45% compared to 10% in NHW, and before age 75, it was 69% and 27%, respectively. The most significant differences noted between NHAIAN and NHW were in those 25-54, however. The authors calculated the rate ratio for

mortality in ages 25-34, 35-44, and 45-54, with the rate ratios being 7.0, 8.8, and 7.0,

respectively. With age standardization, the rate ratio was 2.2 for NHAIAN compared to NHW.

Additionally, comparing NHAIAN to NHW, premature mortality before 65 years of age per

100,000 person-years was 57.1 compared to 9.5, and premature mortality before age 75 was 79.9

compared to 16.4, respectively.

Furthermore, Bassett, Chen, & Krieger (2020) compared years of premature living lost

(PYLL) between NHAIAN and NHW. NHAIAN lost 46,015 more years of life before age 65

than NHW, and before age 75, the difference was 151,625 years. The NHAIAN population lost

nine times as many years of life before age 65 compared to the NHW population. Once again,

COVID-19 reporting is voluntary, so mortality is likely underestimated for this population.

Mortality has been a great concern during the pandemic, but it soon became apparent that

COVID-19 could cause devastating morbidity. Shekhar et al. (2020) noted just over one-third of

COVID-19 patients suffered neurological symptoms, such as headache, dizziness, loss of sense

of taste or smell, and neuralgia, and began to study the long-term neurological complications that

can occur with COVID-19 infection. This study included 90 patients: 53 Native Americans, 25

Caucasians, four African Americans, and eight identified as "other." Five female and two male

patients developed neurological complaints; six of these patients were Native American and one

was Caucasian. The average age for females was 55 years and for males was 65. Only two of

these patients had comorbidities: both had diabetes; one had congenital disabilities of her hands

and feet and the other had obesity, asthma, anxiety, and depression.

At presentation, all seven patients had altered mental status, four developed seizures,

three had subarachnoid hemorrhages, and two suffered ischemic strokes; all required intensive

care and five required intubation. These patients were hospitalized for between six and 19 days and were in the intensive care unit for two to 17 days (Shekhar et al., 2020).

This study had a small sample size in one very specific region of the United States. Following these patients longitudinally could lead to more complete results, as well.

COVID-19 Infection and Long-Term Mental Health Effects on American Indians

At the time of this study, three studies had been completed on the long-term mental health effects of COVID-19 on American Indians. The studies investigated how historical or childhood trauma and sleep quality can affect psychological stress due to COVID-19.

John-Henderson (2020) hypothesized that the COVID-19 pandemic could increase psychological stress in American Indians. At the end of February 2020, a convenience sample of 210 American Indian adults completed a survey including demographics, sleep quality, and childhood trauma. Two months later, participants completed a second survey including psychological stress related to COVID-19 and repeated measures of sleep quality. Participants ranged in age from 30 to 99 years and 59.5% were female. More than half of the participants reported income of less than $40,000 annually, with 13.7% earning between $40,000 and $60,000, 8.8% earning between $80,000 and $100,000, and 14.1% earning above $100,000 (John-Henderson, 2020). Differences in age, income, or early life trauma between participants were not statistically significant.

The Risky Family Questionnaire was used to assess physical, mental, and emotional abuse and neglect in childhood by ranking the frequency of quarreling, shouting, and violent behaviors observed or experienced in childhood on a five-point Likert scale. The questionnaire had good internal reliability with a Cronbach alpha of 0.92 (John-Henderson, 2020). To assess sleep quality, participants completed the Pittsburgh Sleep Quality Index, which categorizes sleep

quality by latency, duration, efficiency, disturbances, daytime dysfunction, and medication needed. Cronbach alpha for the first survey was 0.73 and for the second was 0.75. Finally, participants rated psychological stress from COVID-19 on a seven-point Likert scale from "not stressed" to "extremely stressed" and ranked their annual income on a six-point Likert scale from under $20,000 to $100,000 and above (John-Henderson, 2020).

John-Henderson (2020) completed linear regression models with childhood trauma as a predictor for sleep quality, while controlling for age, sex, income, and current sleep quality. The author completed a second linear regression to assess the relationship between childhood trauma and psychological stress related to COVID-19.

The results indicate that having more traumatic events in childhood correlated with more significant declines in sleep quality. Additionally, psychological stress from COVID-19 could be predicted by the level of reported childhood trauma (John-Henderson, 2020).

Next, John-Henderson and Ginty (2020) emphasized that historical trauma, or the loss of cultural beliefs and tribal lands, can accumulate emotional and psychological damage. Their theory, called stress-sensitization, predicts that, with more significant historical trauma, individuals will have higher levels of psychological stress. The authors had two hypotheses: the first being that participants who reported greater historical trauma would have more significant psychological stress related to COVID-19. The second was that the authors would be able to predict changes in psychological stress, based on the individual's level of self-perceived historical trauma (John-Henderson & Ginty, 2020).

The same convenience sample from the John-Henderson (2020) study was used for this study, though there was attrition of five participants. The average age of participants was 53 and 59.8% were female. Participants lived in 46 different states with 8.5% living on tribal land. The

first survey, completed at the end of February 2020, collected demographics and measures of

sleep, socioeconomic status, social support, childhood and historical trauma, alcohol

consumption, psychological stress, and symptoms of depression and anxiety. The second survey,

at the end of April 2020, collected repeated psychological stress and depression and anxiety

symptoms, along with participants' zip codes, COVID-19 associated stress, and changes in

physical distancing or disinfecting behaviors.

To assess historical trauma, participants completed the standardized Historical Loss

Scale, by rating the frequency in which they think about the loss of their historical land, culture,

and people due to colonization. Twelve items were ranked on a six-point Likert scale from

'never' to 'several times a day', resulting in a Cronbach alpha of 0.95. The Interpersonal Support

Evaluation List-12 measured social support using a four-point Likert scale. Participants self-

reported their reactions to unpredictable and uncontrollable psychological stress using the

Perceived Stress Scale-10. Cronbach alpha was 0.81 and 0.79, respectively. To measure

psychological stress, participants completed the same seven-point Likert scale as in the previous

study, rating how they feel when thinking of COVID-19 from "not at all stressed" to "extremely

stressed." Participants ranked symptoms using The Hospital Anxiety and Depression Scale with

a Cronbach alpha of 0.88 for anxiety and 0.86 for depression. Finally, participants completed the

Risky Family Questionnaire to assess childhood trauma, which had a Cronbach alpha of 0.92

(John-Henderson & Ginty, 2020).

John-Henderson & Ginty (2020) completed hierarchal linear regressions to assess the

relationship between historical loss and changes in psychological stress in American Indian

adults. In addition, the authors added social support as an interaction and used the Johnson-

Neyman technique to determine if historical trauma, social support, and psychological stress had

a significant correlation. The data controlled for income, age, sex, anxiety and depression symptoms, COVID-19 psychological stress, and childhood trauma.

The results agreed with the authors' hypothesis: more significant historical trauma correlated with greater psychological stress due to COVID-19. Secondly, those with higher levels of social support showed less psychological stress, anxiety, and depression, even if they reported high levels of historical trauma. Participants who had the most statistically significant changes scored less than nine on the Interpersonal Support Evaluation List-12, meaning that those who felt they had social support did not show increased psychological stress due to COVID-19 despite their level of historical trauma predicting they would.

This data is self-reported and prospective, which limits its generalizability. In addition, previous studies show that American Indians who live on tribal land place more importance on historical trauma throughout their lives, but those living in urban settings typically score higher on the Historical Loss Scale. In this study, 8.5% of participants lived on tribal land while 91.5% did not, meaning the data could be skewed (John-Henderson & Ginty, 2020).

In the final study, John-Henderson & Mueller (2020) used the same convenience sample as above and assessed the relationship between their health mindset and their physical distancing and disinfecting behaviors during the pandemic. This was important, as physical distancing and disinfecting behaviors were recommended by the CDC to help prevent COVID-19 spread. However, physical distancing and disinfecting can be difficult in many American Indian households due to overcrowding in multi-generational housing, where many lack complete plumbing (John-Henderson & Mueller, 2020).

The first survey, collected one month before the declaration of COVID-19 as a pandemic, included demographics and a measure of whether the participants had a fixed or modifiable

health mindset. Participants completed a second survey in April or May 2020 regarding health mindset and physical distancing and disinfecting behaviors. Health mindset was measured using a three-item scale developed for this study, based on work by Carol Dweck. Participants rated whether they believed they could change their health by changing their behaviors on a six-point Likert scale. Lower ratings signified the belief that health was fixed and could not be changed. In contrast, high scores meant participants believed they could change their behaviors and positively impact their health. Physical distancing and disinfecting behaviors were self-reported and noted how often participants washed their hands, limited their time in crowded areas, maintained a six-foot distance from others, and used hand sanitizer. Participants rated this on a five-point Likert scale from "not at all" to "a great deal" (John-Henderson & Mueller, 2020).

Hierarchal linear regression was completed and controlled for age, sex, and income; this found that health mindset could predict how often participants engaged in physical distancing and disinfecting. Those with a modifiable health mindset engaged in more physical distancing and disinfecting than those with a fixed health mindset (John-Henderson & Mueller, 2020).

This study is limited because it used convenience sampling with surveys collected online, meaning participants needed internet access to complete the surveys. Of note, more than half of these participants made less than $40,000 annually (John-Henderson & Mueller, 2020).

Anticipated Results

The hypothesis of this study is that American Indians will suffer longer-lasting physical and mental health concerns and have exacerbations of comorbid conditions due to COVID-19.

Discussion

The purpose of this study was to gain a better understanding of the factors that put American Indians at higher risk for contracting COVID-19. Additionally, this study investigated how the COVID-19 pandemic has impacted the physical and mental health of American Indians.

The results support the hypothesis that COVID-19 exacerbates comorbid conditions. Additionally, American Indians have suffered greater mortality than the Caucasian population in the United States. Currently, it is difficult to determine whether American Indians have longer-lasting physical and mental health implications, as the pandemic is ongoing, and scientists are still researching "long-COVID."

The results of this study align with the pattern established by previous literature showing that American Indians are at higher risk for comorbidities and that these comorbidities can exacerbate acute infectious processes. These studies also confirm that structural inequality contributes to higher rates of COVID-19 in American Indians.

This study shows that this is a complicated situation and is multifactorial; it highlights racial and structural inequalities facing the American Indian population and how this affects their health. There is a lack of COVID-19 demographic data from 27 states in the United States which highlights a need for increased public health services, from infrastructure to testing supplies. The melding of environmental and structural inequalities predisposes American Indians to chronic illness, increasing their risk for COVID-19 mortality and morbidity. Namely, American Indians have retained similar genetics to their pre-Columbian ancestors, meaning modern day American Indians haven't adapted to a changing landscape of infectious disease.

Prior to the pandemic, American Indians had the highest rates of obesity and diabetes, the second highest rate of asthma, and the lowest rate of insurance coverage compared to other racial and ethnic groups within the United States (Yellow Horse, Yang, & Huyser, 2020). American Indians are at higher risk for comorbidities related to poor prognosis with COVID-19. All of these studies agree that age is the most serious risk factor for COVID-19 and many show that men are slightly more at risk. These studies also show that American Indians are

disproportionately affected by COVID-19, especially in those under the age of 65. Often this was

the population who worked in professions considered 'essential' during the pandemic, so were

unable to stay home and physically distance. By doing so, they faced loss of income which led to

food insecurity or loss of housing.

Additionally, this study highlights the need for better and more complete physical and

mental healthcare access for American Indians. Many American Indians suffer from historical

loss and childhood trauma, which makes them susceptible to physical and mental health

illnesses. Interestingly enough, American Indians who live in urban settings typically score

higher on the Historical Loss Scale (John-Henderson & Ginty, 2020) so even when they appear

to have assimilated into the majority population, healthcare providers should screen for

psychological stress and social support. High levels of social support buffers this stress and

creates better coping skills. Cultural support negates the adverse effects of childhood trauma,

poverty, and anxiety or depression symptoms which increases resilience and life satisfaction.

Furthermore, healthcare providers must take into account whether a patient believes they can

improve their health; a modifiable health mindset correlates to their response to stress, success in

personal relationships, and creates higher educational achievement (John-Henderson & Ginty,

2020). Modifiable mindsets in American Indian college students predicted lower body mass

index and higher level of physical activity, leading to better health (John-Henderson & Mueller,

2020).

Although the present results support the hypotheses of this study, it is important to

recognize several potential limitations. The literature is lacking on the long-term physical and

mental health implications of COVID-19, as, at the time of this study, the pandemic has been

ongoing for only 18 months. Additionally, minorities are underrepresented in literature regarding

healthcare disparity mostly due to a lack of funding. The studies included in this literature review are vastly different in their methodology: surveys, meta-analyses, and case studies. Comparisons should be made cautiously.

Despite these limitations, these results suggest several theoretical and practical implications. American Indians have been disproportionately affected by many epidemics and pandemics: smallpox, influenza A, tuberculosis, and now COVID-19. One study noted (Arrazola et al., 2020) that those most impacted by preventable illnesses should be first in line for vaccination. Social distancing and hand hygiene were the two most essential prevention factors according to the CDC, but American Indians often live in crowded housing that lacks complete plumbing making this difficult. Based on this, infrastructure and testing supplies should be used disproportionately in their favor since morbidity and mortality will be more devastating to this population. Lastly, healthcare providers should be aware of patients who have comorbid conditions or early life trauma and screen them for psychological stress during times of unrest, as this could potentially affect their health more than others.

The present study represents a first attempt to address these issues. Since it has been established that American Indians have different innate immunity than Caucasians, it would be useful to collect demographics in all studies regarding COVID-19's effects. Additionally, examining the relationship between innate immunity and COVID-19 may shed light on how to best treat specific patient populations. It would be useful to longitudinally follow COVID-19 patients for the purpose of understanding the long-term physical and mental health effects, deemed "long-COVID."

Applicability to Clinical Practice

In the United States, 5.2 million people identify as American Indian or Alaska Native (US Census Bureau, 2012), most of whom are underserved by medical care. Life expectancy for an American Indian or Alaska Native is 5.5 years less than all races combined within the United States, with heart disease, diabetes, and chronic lower respiratory disease as three of the leading causes (Indian Health Service, 2019). Indian Health Services only covers 60% of the healthcare needs for American Indians and Alaska Natives (US Commission on Civil Rights, 2003), meaning healthcare providers in the general population are treating this population daily. By understanding how COVID-19 has affected this population's mental and physical health, changes can be made to improve access to healthcare services and provide more personalized services to better the health of American Indians.

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