Beer Consumption Correlated with Three Times Lower Death Rate by the Corona Virus 3/31/2020

1.0 Abstract

In this study we are looking for how beer drinking may be correlated corona virus deaths, and a possible mechanism for these correlations.

Natural hops are active against series of RNA and DNA viruses, Antiviral activity of hop constituents against series of DNA and RNA viruses.[10] It is investigated here to determine if beer drinking is associated with less cases andor less rates of corona virus Covid-19. The death rate per million population is 4 times lower in the high beer drinking countries.


While looking at the data at Worldometer on the corona virus Covid-19, I noticed something about Germany. The death rate in Germany was about 0.3 percent and in Italy it is about 8 percent at the time.

I started to think about the cultural difference of Germany and noted that they drink more beer than most countries. In fact, Germany is in the top four beer drinking countries in the world and much of the population drinks beer. I took about 39 countries with significant corona virus Covid-19 infections or significant drinking or on the list of beer drinking countries. I divided the group into two groups. The highest beer drinking groups and the lowest beer drinking group. China would have been in the lowest 36, but it was excluded because it had a head start on having infections, and it would skew the data. More southern countries have not been included because it looks more and more like warm temperatures or more sun exposure help to prevent or fight off corona virus covid-19 and all those southern, with low rates of corona virus, would skew the data.

2.0 Data

The following data is data collected from the Worldometer [1] on the date of 3/10/2020. The beer consumption was Wikipedia [2]

Natural hops are active against series of RNA and DNA viruses, Antiviral activity of hop constituents against series of DNA and RNA viruses.[10] It is investigated here to determine if beer drinking is associated with less cases andor less rates of corona virus Covid-19.


While looking at the data at Worldometer on the corona virus Covid-19, I noticed something about Germany. At the current writing, they have about a 0.3 percent death rate, whereas Italy is over 8 percent. I started to think about the cultural difference of Germany and noted that they drink more beer than most countries. In fact, Germany is in the top four beer drinking countries in the world and much of the population drinks beer. I took about 39 countries with significant corona virus Covid-19 infections or significant drinking or on the list of beer drinking countries. I divided the group into two groups. The highest beer drinking groups and the lowest beer drinking group. China would have been in the lowest beer drinking group, but it was excluded because it had a head start on having infections, and it would skew the data. More southern countries have not been included because it looks more and more like warm temperatures or more sun exposure help to prevent or fight off corona virus covid-19 and all those southern countries, with low rates of corona virus, would skew the data. The initial beer drinking data for Spain was
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incorrect and it was placed in the high beer drinking countries, the data was found to be incorrect from the source. Spain is a low beer drinking country.

### High Beer Consumption Countries

<table>
<thead>
<tr>
<th>Per capita beer liters per year</th>
<th>Per capita beer gallons per year</th>
<th>death rate per 100</th>
<th>country</th>
<th>Population</th>
<th>Total Corona virus in country</th>
<th>Total deaths from corona virus in country</th>
</tr>
</thead>
<tbody>
<tr>
<td>143</td>
<td>38.15368</td>
<td>0.951796131</td>
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<td>10122</td>
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<tr>
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<td>1.000293341</td>
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<td>6</td>
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<td>Hungary</td>
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<tr>
<td>59</td>
<td>15.74173</td>
<td>0.727428327</td>
<td>Russia*</td>
<td>73</td>
<td>2337</td>
<td>17</td>
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<td>706</td>
<td>329309</td>
<td>8207</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>average death per million</td>
<td>11.62464589</td>
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</tbody>
</table>

### Low Beer Consumption Countries

<table>
<thead>
<tr>
<th>Per capita beer liters per year</th>
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<td>59</td>
<td>15.74173</td>
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<td>17</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Beer Consuming Country</th>
<th>Average Death Rate</th>
<th>Average Deaths per Million People</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>10.1</td>
<td>4435</td>
</tr>
<tr>
<td>Bosnia</td>
<td>3.3</td>
<td>411</td>
</tr>
<tr>
<td>Canada</td>
<td>37.7</td>
<td>8467</td>
</tr>
<tr>
<td>Denmark</td>
<td>5.8</td>
<td>2860</td>
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<tr>
<td>Switzerland</td>
<td>8.7</td>
<td>16186</td>
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<tr>
<td>Spain</td>
<td>46.8</td>
<td>94417</td>
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<tr>
<td>Portugal</td>
<td>10.3</td>
<td>7443</td>
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<tr>
<td>Norway</td>
<td>5.4</td>
<td>4605</td>
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<tr>
<td>South Korea</td>
<td>51.3</td>
<td>9786</td>
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<tr>
<td>Japan</td>
<td>126</td>
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<tr>
<td>Greece</td>
<td>10.4</td>
<td>1314</td>
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<td>France</td>
<td>65.3</td>
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<td>Italy</td>
<td>60.5</td>
<td>105792</td>
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<tr>
<td>Taiwan</td>
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<td>Hong Kong</td>
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<td>Israel</td>
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<td>Turkey</td>
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<td></td>
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<tr>
<td>37.57829904</td>
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<td></td>
</tr>
</tbody>
</table>

It was first noticed that Germany had almost no deaths from the corona virus Covid-19. It could be that an ingredient in beer could be affecting the virus or protecting from some affect of the virus. Xanthohumol is an ingredient from hops or humulus lupulus plant. A study was done relating to an ingredient in hops, xanthohumol, that had protective affects from angiotensin II.[3]

It is possible that xanthohumol from hops when it is in beer may have some protective affects against the Corona virus Covid-19.[3]

This ratio of deaths is almost 3.23 times higher for the low beer drinking countries.

[5] There may also be other natural ingredients or natural phenomena that protect against the Corona virus Covid-19. It should be of note that countries in the southern hemisphere have largely been unaffected. This could be from temperature or some other affect related to summer such as higher vitamin D levels or higher infrared light exposure etc.

Scientists have shown how the corona virus Covid-19 infects cells.[4] It involves the angiotensin II receptor.

This data with beer consuming countries will be followed to see if the correlation still holds. Sesame oil will also be checked for a correlation. Hopefully summer brings relief to the northern hemisphere soon.
3.0 Discussion

High per capita beer drinking countries, had a death per million people that was 3 times lower than low per capita beer drinking countries.

Natural hops active against series of RNA and DNA viruses, Antiviral activity of hop constituents against series of DNA and RNA viruses.[10] It is investigated here to determine if beer drinking is associated with less cases andor less rates of corona virus Covid-19.

Natural product-derived antiviral Therapy: Xanthohumol, found in Humulus lupulus/Hops and Beer, inhibits Hepatitis-B/C, Dengue, Zika, Ebola, HIV-1, Mtb, Malaria, CMV, Influenza, H1N1, RSV, Sinbis, and SFV viruses by increasing the levels of antiviral proteins IFITM3. Interferon-stimulated gene 15, 4/January/2017, [6]

In MERS, which was another similar corona virus it was found that IFITM proteins inhibit entry driven by the MERS-coronavirus spike protein: evidence for cholesterol-independent mechanisms. [8] Since xanthohumol increases the levels of IFITM3 it may have similar results of inhibiting the entry driven by Covid-19 corona virus.

It was found in the SARS virus, which the corona virus Covid-19 is most similar to Distinct patterns of IFITM-mediated restriction of filoviruses, SARS coronavirus, and influenza A virus. [9] In SARS replication and entry by SARS is inhibited by IFITM.[9] Similar mechanism could be acting on Covid-19 and since xanthohumol increases IFITM replication and entry by Covid-19 could be inhibited.

Inhibition of Hepatitis C Virus Replication In Vitro by Xanthohumol, A Natural Product Present in Hops[7]
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4.0 References

1.) https://www.worldometers.info/coronavirus/
2.) https://en.wikipedia.org/wiki/List_of_countries_by_beer_consumption_per_capita
3.) https://figshare.com/articles/A_new_formylated_chalcone_from_i_Humulus_lupulus_i_with_protective_effect_on_HUVECs_injury_by_angiotensin_II/5631826
5.) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6737023/
7.) https://www.researchgate.net/publication/259395062_Inhibition_of_Hepatitis_C_Virus_Replication_In_Vitro_by_Xanthohumol_A_Natural_Product_Present_in_Hops
8.) https://www.ncbi.nlm.nih.gov/pubmed/25256397