odd_ratio

May 9, 2023

[ ]:
```
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import fisher_exact, norm
```

[ ]:
```
def calc_odds_ratio(a, b, c, d):
    odds_ratio = (a * d) / (b * c)
    p_value = fisher_exact([[a, b], [c, d]])[1]
    se = np.sqrt(1/a + 1/b + 1/c + 1/d)
    z = np.log(odds_ratio) / se
    confint = np.exp(norm.ppf(0.025) * se), np.exp(norm.ppf(0.975) * se)
    return odds_ratio, p_value, confint
```

[ ]:
```
#Age
odds_ratio, p_value, confint = calc_odds_ratio(164, 200, 30, 46)

print("The Fisher's Exact Association for age =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for age =
Odds ratio:  1.257
P-value:  4.462e-01
confint_lower 0.604
confint_upper 1.656
```

not significant

[ ]:
```
#Sex
odds_ratio, p_value, confint = calc_odds_ratio(150, 190, 44, 56)

print("The Fisher's Exact Association for Sex =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Sex =
```

```
Odds ratio:  1.005
P-value:  1.000e+00
confint_lower 0.638
confint_upper 1.567
```

Not Significant

[ ]:
```
#History of taking drugs
odds_ratio, p_value, confint = calc_odds_ratio(29, 26, 165, 220)

print("The Fisher's Exact Association for History of taking drugs =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for History of taking drugs =
Odds ratio:  1.487
P-value:  1.920e-01
confint_lower 0.567
confint_upper 1.762
```

Not significant

[ ]:
```
#Boiling drinking water
odds_ratio, p_value, confint = calc_odds_ratio(28, 53, 250, 109)

print("The Fisher's Exact Association for Boiling drinking water =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Boiling drinking water =
Odds ratio:  0.230
P-value:  8.657e-09
confint_lower 0.600
confint_upper 1.666
```

[ ]:
```
#Washing hand after visiting toilet
odds_ratio, p_value, confint = calc_odds_ratio(90, 90, 150, 110)

print("The Fisher's Exact Association for Washing hand after visiting toilet =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Washing hand after visiting toilet =
Odds ratio:  0.733
```

```
P-value:  1.199e-01
confint_lower 0.683
confint_upper 1.465
```

[ ]:
```
#Washing hand with soap
odds_ratio, p_value, confint = calc_odds_ratio(40, 110, 150, 140)

print("The Fisher's Exact Association for Washing hand with soap =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Washing hand with soap =
Odds ratio:  0.339
P-value:  5.446e-07
confint_lower 0.651
confint_upper 1.536
```

[ ]:
```
#Souce of Fruits/Vegetables
odds_ratio, p_value, confint = calc_odds_ratio(52, 77, 142, 169)

print("The Fisher's Exact Association for Involving in Souce of Fruits/
 ↪Vegetables =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Involving in Souce of Fruits/Vegetables =
Odds ratio:  0.804
P-value:  3.428e-01
confint_lower 0.659
confint_upper 1.517
```

[ ]:
```
#Washing fruit before eating
odds_ratio, p_value, confint = calc_odds_ratio(60, 125, 90, 165)

print("The Fisher's Exact Association for Washing fruit before eating =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Washing fruit before eating =
Odds ratio:  0.880
P-value:  5.428e-01
confint_lower 0.670
confint_upper 1.493
```

[ ]:
```
#Eating food sold in open place
odds_ratio, p_value, confint = calc_odds_ratio(120, 76, 100, 144)

print("The Fisher's Exact Association for Eating food sold in open place =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Eating food sold in open place =
Odds ratio:  2.274
P-value:  3.506e-05
confint_lower 0.681
confint_upper 1.469
```

[ ]:
```
#Wearing shoes frequently
odds_ratio, p_value, confint = calc_odds_ratio(90, 204, 120, 26)

print("The Fisher's Exact Association for Wearing shoes frequently =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Wearing shoes frequently =
Odds ratio:  0.096
P-value:  3.008e-25
confint_lower 0.612
confint_upper 1.634
```

[ ]:
```
#Swimming in stream/river/pool
odds_ratio, p_value, confint = calc_odds_ratio(50, 70, 147, 173)

print("The Fisher's Exact Association for Swimming in stream/river/pool =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Swimming in stream/river/pool =
Odds ratio:  0.841
P-value:  4.522e-01
confint_lower 0.654
confint_upper 1.529
```

[ ]:
```
#Improved water source
odds_ratio, p_value, confint = calc_odds_ratio(24, 126, 250, 40)

print("The Fisher's Exact Association for Improved water source =")
```

```
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Improved water source =
Odds ratio:  0.030
P-value:  5.376e-49
confint_lower 0.577
confint_upper 1.732
```

[ ]:
```
#Latarines
odds_ratio, p_value, confint = calc_odds_ratio(290, 30, 40, 80)

print("The Fisher's Exact Association for Latarines =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Latarines =
Odds ratio:  19.333
P-value:  1.272e-32
confint_lower 0.586
confint_upper 1.706
```

[ ]:
```
#Flies/Cockroaches in sanitary facilities
odds_ratio, p_value, confint = calc_odds_ratio(320, 50, 30, 40)

print("The Fisher's Exact Association for Flies/Cockroaches in sanitary␣
 ↪facilities =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Flies/Cockroaches in sanitary facilities =
Odds ratio:  8.533
P-value:  5.356e-14
confint_lower 0.572
confint_upper 1.750
```

[ ]:
```
#Involving in farming activities
odds_ratio, p_value, confint = calc_odds_ratio(100, 200, 50, 90)

print("The Fisher's Exact Association for Involving in farming activitiess =")
print("Odds ratio: ", "{:.3f}".format(odds_ratio))
print("P-value: ", "{:.3e}".format(p_value))
```

```
print("confint_lower", "{:.3f}".format(confint[0]))
print("confint_upper", "{:.3f}".format(confint[1]))
```

```
The Fisher's Exact Association for Involving in farming activitiess =
Odds ratio:  0.900
P-value:  6.661e-01
confint_lower 0.656
confint_upper 1.523
```

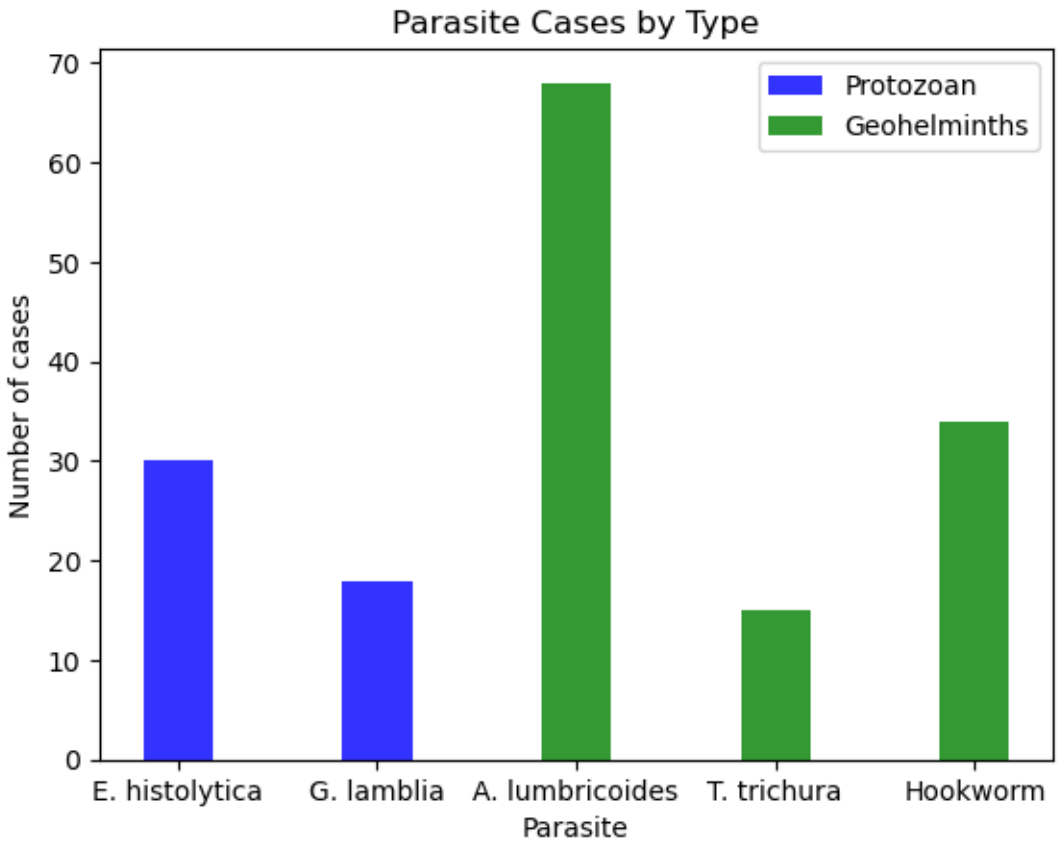
[ ]:
```
#Barchat Plot
protozoan = {'E. histolytica': 30, 'G. lamblia': 18}
geohelminths = {'A. lumbricoides': 68, 'T. trichura': 15, 'Hookworm': 34}


fig, ax = plt.subplots()
bar_width = 0.35
opacity = 0.8


protozoan_bars = ax.bar(protozoan.keys(), protozoan.values(), bar_width,␣
 ↪alpha=opacity, color='b', label='Protozoan')
geohelminths_bars = ax.bar(geohelminths.keys(), geohelminths.values(),␣
 ↪bar_width, alpha=opacity, color='g', label='Geohelminths')


ax.set_xlabel('Parasite')
ax.set_ylabel('Number of cases')
ax.set_title('Parasite Cases by Type')
ax.set_xticks(list(protozoan.keys()) + list(geohelminths.keys()))
ax.legend()
```

[ ]:
```
<matplotlib.legend.Legend at 0x7f688331b050>
```


Parasite Cases by Type
Protozoan
Geohelminths
Number of cases
0
10
20
30
40
50
60
70
E. histolytica
G. lamblia
A. lumbricoides
T. trichura
Hookworm
Parasite