Mantas Valiulis \ Lab. darbas Nr. 1, II dalis

In [1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import r2_score
```

Pagrindinė dalis

Naudojamas I-oje dalyje išsaugotas csv failas su apdorotu 'esoph' duomenų rinkiniu.

In [2]:
```
df = pd.read_csv('esoph_df.csv')
df
```

Out[2]:

	agegp	alcgp	tobgp	ncases	ncontrols	cases_ratio
0	30	20	5	0	40	0.0
1	30	20	15	0	10	0.0
2	30	20	25	0	6	0.0
3	30	20	30	0	5	0.0
4	30	60	5	0	27	0.0
...	...	...	...	...	...	...
83	80	60	30	1	1	50.0
84	80	100	5	1	1	50.0
85	80	100	15	1	1	50.0
86	80	120	5	2	2	50.0
87	80	120	15	1	1	50.0

88 rows × 6 columns

Paskaičiuojama koreliacijos matrica atmetus 'ncontrols' ir 'ncases' stulpelius

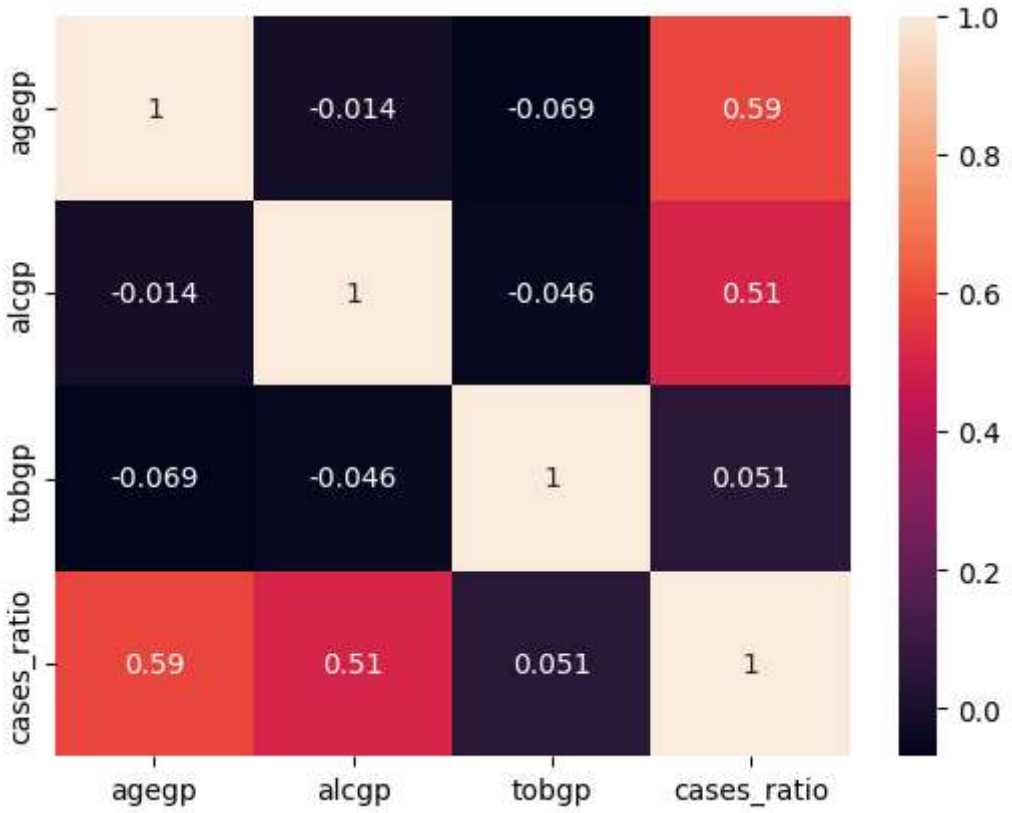
In [3]:
```
corr_matrix = df.loc[:,~df.columns.isin(['ncontrols','ncases'])].corr()
corr_matrix
```

Out[3]:

	agegp	alcgp	tobgp	cases_ratio
agegp	1.000000	-0.013670	-0.068779	0.587032
alcgp	-0.013670	1.000000	-0.045684	0.506651
tobgp	-0.068779	-0.045684	1.000000	0.050709
cases_ratio	0.587032	0.506651	0.050709	1.000000

In [4]:
```
sns.heatmap(corr_matrix, annot=True)
```

Out[4]:
```
<Axes: >
```



Toliau naudojamas 'esoph' duomenų rinkinys su nepakeistomis kategorijų reikšmėmis. Pavaizduojamos stulpelinės diagramos.

In [5]:
```
df2 = pd.read_csv('esoph_df2.csv')
df2
```

Out[5]:

	agegp	alcgp	tobgp	ncases	ncontrols	cases_ratio
0	25-34	0-39g/day	0-9g/day	0	40	0.0
1	25-34	0-39g/day	10-19	0	10	0.0
2	25-34	0-39g/day	20-29	0	6	0.0
3	25-34	0-39g/day	30+	0	5	0.0
4	25-34	40-79	0-9g/day	0	27	0.0
...	...	...	...	...	...	...
83	75+	40-79	30+	1	1	50.0
84	75+	80-119	0-9g/day	1	1	50.0
85	75+	80-119	10-19	1	1	50.0
86	75+	120+	0-9g/day	2	2	50.0
87	75+	120+	10-19	1	1	50.0

88 rows × 6 columns

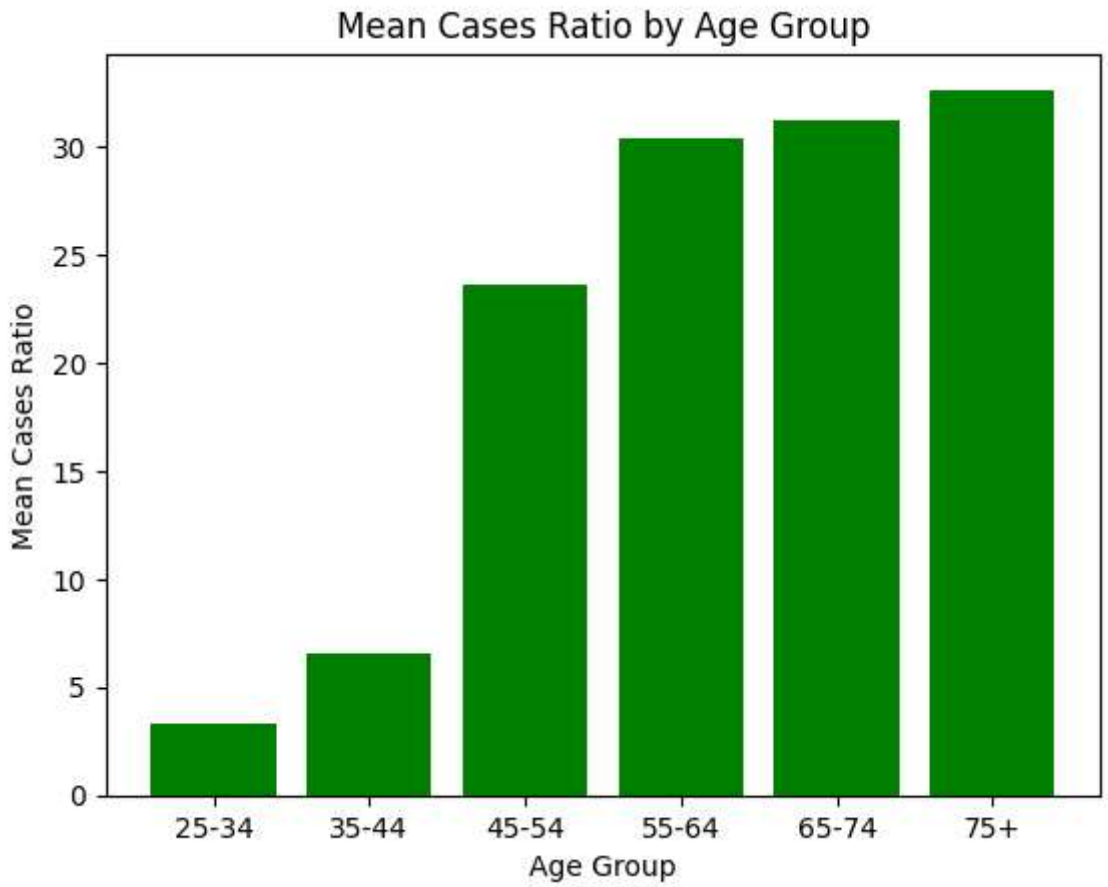
In [6]:

```
mean_cases_ratio_by_agegp = df2.groupby('agegp')['cases_ratio'].mean().reset_index()

plt.bar(mean_cases_ratio_by_agegp['agegp'], mean_cases_ratio_by_agegp['cases_ratio'],color = "green")

plt.title("Mean Cases Ratio by Age Group")
plt.xlabel("Age Group")
plt.ylabel("Mean Cases Ratio")

plt.show()
```

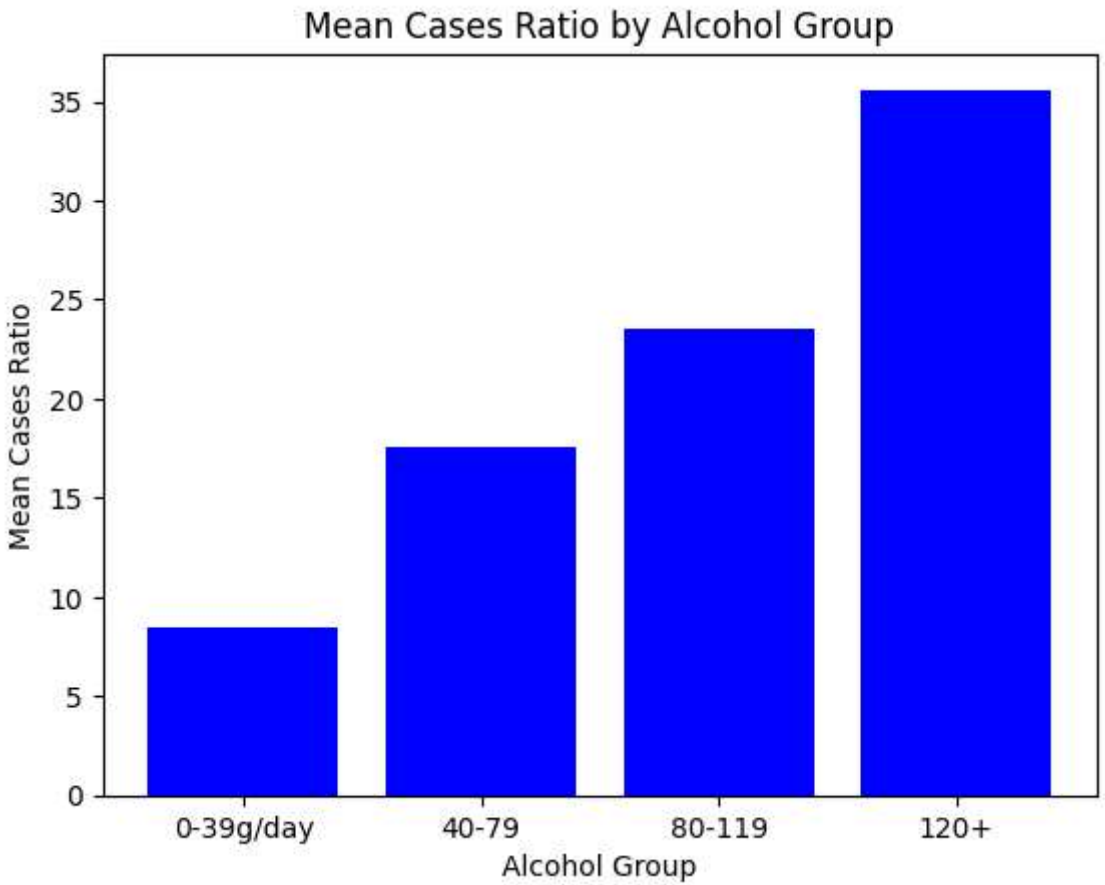


In [7]:
```
mean_cases_ratio_by_alcgp = df2.groupby('alcgp')['cases_ratio'].mean().reset_index().sort_values(by = 'cases_ratio')

plt.bar(mean_cases_ratio_by_alcgp['alcgp'], mean_cases_ratio_by_alcgp['cases_ratio'],color = "blue")

plt.title("Mean Cases Ratio by Alcohol Group")
plt.xlabel("Alcohol Group")
plt.ylabel("Mean Cases Ratio")

plt.show()
```

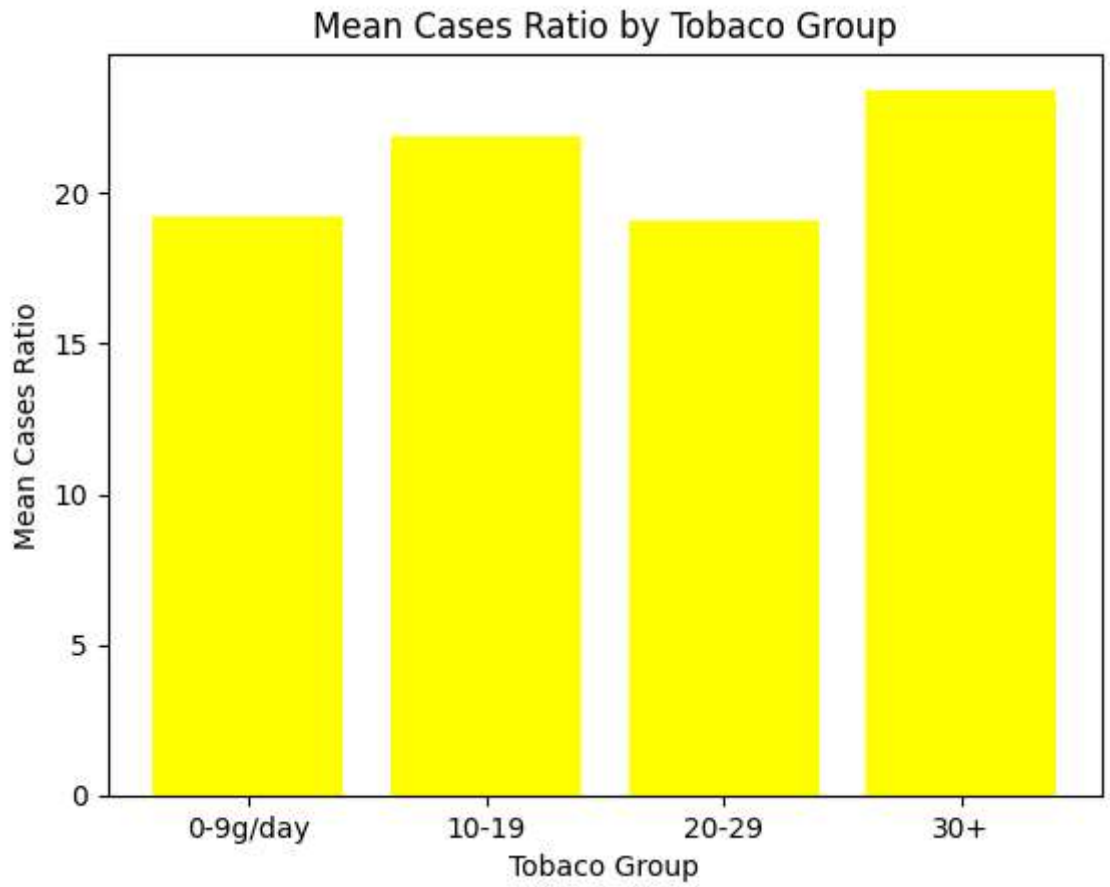


In [8]:
```
mean_cases_ratio_by_tobgp = df2.groupby('tobgp')['cases_ratio'].mean().reset_index()

plt.bar(mean_cases_ratio_by_tobgp['tobgp'], mean_cases_ratio_by_tobgp['cases_ratio'],color = "yellow")

plt.title("Mean Cases Ratio by Tobaco Group")
plt.xlabel("Tobaco Group")
plt.ylabel("Mean Cases Ratio")

plt.show()
```



Papildoma dalis

Remiantis amžiaus, alkoholio ir tobako grupėmis, apmokomas tiesinės regresijos modelis paskaičiuoti vėžio susirgimų santykį.

In [9]:
```
X = df[['agegp', 'alcgp','tobgp']]
y = df['cases_ratio']

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2,random_state = 0)

model = LinearRegression()
model.fit(X_train, y_train);
```

Įvertinamas modelio tikslumas

In [10]:
```
y_pred = model.predict(X_test)
print(f'R^2 score: {r2_score(y_test, y_pred)}')

coefficients = model.coef_
column_names = X.columns
for col_name, coef in zip(column_names, coefficients):
    print(f'Coefficient for {col_name}: {coef}')
```

```
R^2 score: 0.6310980503621302
Coefficient for agegp: 0.6550317157754454
Coefficient for alcgp: 0.258778833005511
Coefficient for tobgp: 0.21166518388434427
```

Pavyzdinis spėjimas, remiantis duotais duomenimis

In [11]:
```
new_data = pd.DataFrame({'agegp': [80,30,20],
                         'alcgp': [50,120,90],
                         'tobgp': [20,30,40]})
predicted_cases_ratio = model.predict(new_data)
print(predicted_cases_ratio)
```

```
[32.662044   20.14162836  7.94459805]
```