Analysis of Tooth Growth by Supplement Type
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The ToothGrowth, an in-built dataset, explores the impact of vitamin C on tooth growth in guinea pigs, measured by tooth length. This analysis examines tooth length(numerical) and supplement type(categorical: Orange Juice(OJ) and Ascorbic Acid(VC)) for 60 guinea pigs.

As per [Table 1.1], tooth lengths range from 4.2mm to 33.9mm, with an average length of 18.81mm and a median of 19.25mm, indicating a mildly left-skewed distribution. This skewness, driven by a few smaller tooth lengths that pull the average down, highlights the smaller tooth lengths for both supplements. Most tooth lengths fall within the interquartile range of 13.07mm to 25.27mm, reflecting moderate variability. It implies that while not all guinea pigs show identical growth, most have stable growth.

When analyzed by supplement type, Orange Juice(OJ) proves more effective, yielding an average length of 20.66mm and a median of 22.7mm. Tooth lengths show less variability, with an interquartile range of 10.2mm, as shown in [Table 1.2]. This implies that it is consistent in promoting tooth growth. Conversely, Ascorbic Acid(VC) has a mean of 16.96mm and a median of 16.5mm. It exhibits a wider interquartile range of 11.9mm, as shown in [Table 1.2]. This variability indicates that it is less consistent in promoting tooth growth.

[Figure 1.1] shows a clear difference in the distributions of tooth lengths by supplement type, with Orange Juice(OJ) showing a pronounced peak at higher lengths (25–30mm); it highlights that a significant proportion of the guinea pigs exhibit similar, superior growth, making it a reliable supplement for tooth growth. Conversely, Ascorbic Acid(VC) peaks around smaller lengths (15–20mm) and exhibits greater spread, suggesting that it is less effective in promoting long tooth growth and that a larger number of guinea pigs tend to have more modest or variable growth.

In conclusion, Orange Juice(OJ) consistently promotes greater and more consistent tooth growth than Ascorbic Acid(VC). These findings emphasize the importance of supplement delivery methods in optimizing the effects of vitamin C.

Range (mm)	Average (mm)	Median (mm)	1st Qu. (mm)	3rd Qu (mm)	Interquartile (mm)	Min (mm)	Max (mm)
4.2 to 33.9	18.81	19.25	13.07	25.27	12.2	4.20	33.90

Table** Error! No text of specified style in document.**.1 Summary statistics for metric variable Length

Supplement type	Average (mm)	Median (mm)	1st Qu. (mm)	3rd Qu (mm)	Interquartile (mm)	Min (mm)	Max (mm)
Orange Juice (OJ)	20.66	22.70	15.53	25.73	10.2	8.20	30.90
Ascorbic Acid (VC)	16.96	16.50	11.20	23.10	11.9	4.20	33.90

Table 1.2 Summary statistics for different types of supplements

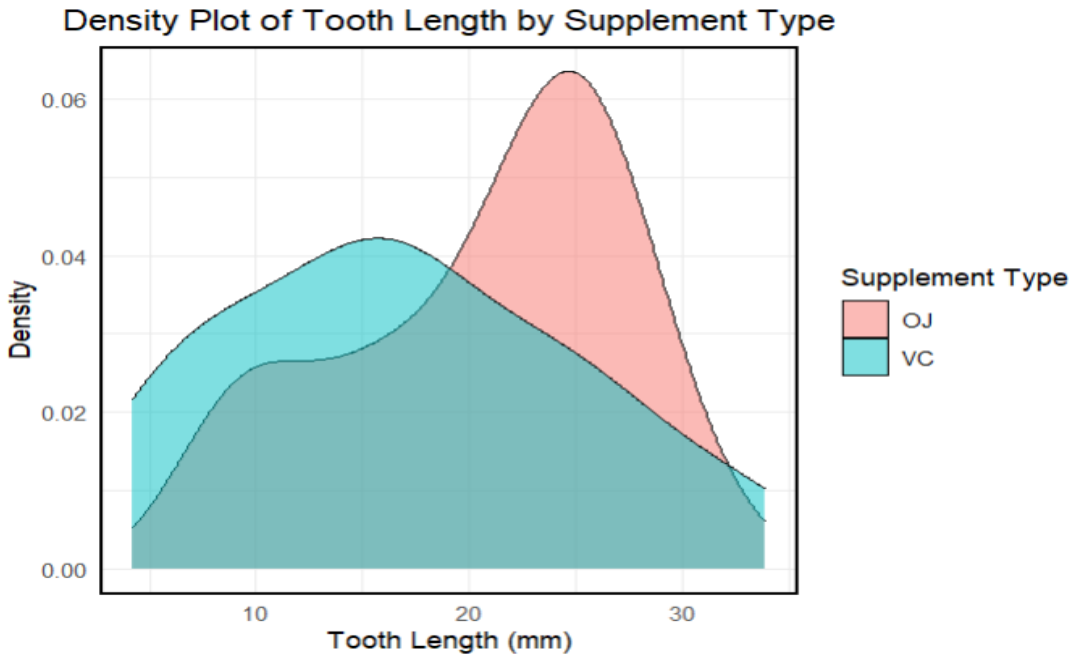

Figure 1.1 Density plot of Length for Supplement Type