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**Question**

A study of Yellow Fever Disease (YFD) was conducted. The study was restricted to patients under the age of 40. One purpose was to compare the distribution of cases by age in group A to that of B. The group data are given below

|  |  |  |
| --- | --- | --- |
| CI | Group A  | Group B |
| 1-5 | 0 | 2 |
| 6-10 | 7 | 4 |
| 11-15 | 10 | 7 |
| 16-20 | 2 | 20 |
| 21-25 | 1 | 16 |
| 26-30 | 5 | 10 |
| 31-35 | 4 | 4 |

Calculate:

1. The mean and standard deviation for each group
2. The coefficient of variation for each group.
3. Which group has less variable distribution.

**Solution**

**(i)**

|  |
| --- |
| **Group A** |
| CI | Class Mark (x) | Frequency (f) | Fx | x-$\overbar{x}$ | (x-$\overbar{x}$)2 | f(x-$\overbar{x}$)2 |
| 1-5 | 3 | 0 | 0 | -14.83 | 219.93 | 0 |
| 6-10 | 8 | 7 | 56 | -9.83 | 96.63 | 676.41 |
| 11-15 | 13 | 10 | 130 | -4.83 | 23.33 | 233.30 |
| 16-20 | 18 | 2 | 36 | 0.17 | 0.03 | 0.06 |
| 21-25 | 23 | 1 | 23 | 5.17 | 26.73 | 26.73 |
| 26-30 | 28 | 5 | 140 | 10.17 | 103.43 | 517.15 |
| 31-35 | 33 | 4 | 132 | 15.17 | 230.13 | 920.52 |
| TOTAL |  | 29 | 517 |  |  | 2374.17 |

Mean ($\overbar{x}$) = $\sum\_{}^{}\frac{fx}{f}$ = $\frac{517}{29}$ = 17.83

Standard Deviation (S.D)= $\sqrt{\frac{\sum\_{}^{}f\left(x-\overbar{x}\right)^{2}}{\sum\_{}^{}f}}$ = $\sqrt{\frac{2374.17}{29}}$ = 81.87

|  |
| --- |
| **Group B** |
| CI | Class Mark (x)  | Frequency (f) | fx | ( x-$\overbar{x}$) | $$(x-\overbar{x)}^{2}$$ | $$f(x-\overbar{x})^{2}$$ |
| 1-5 | 3 | 2 | 6 | -16.51 | 272.58 | 545.16 |
| 6-10 | 8 | 4 | 32 | -11.51 | 132.48 | 529.92 |
| 11-15 | 13 | 7 | 91 | -6.51 | 42.38 | 296.66 |
| 16-20 | 18 | 20 | 320 | -1.51 | 2.28 | 45.60 |
| 21-25 | 23 | 16 | 368 | 3.49 | 12.18 | 194.88 |
| 26-30 | 28 | 10 | 280 | 8.49 | 72.08 | 720.80 |
| 31-35 | 33 | 4 | 132 | 13.49 | 181.98 | 727.92 |
| TOTAL |  | 63 | 1229 |  |  | 3060.94 |

Mean ($\overbar{x}$) = $\sum\_{}^{}\frac{fx}{f}$ = $\frac{1229}{63}$ = 19.51

Standard Deviation (S.D)= $\sqrt{\frac{\sum\_{}^{}f\left(x-\overbar{x}\right)^{2}}{\sum\_{}^{}f}}$ = $\sqrt{\frac{3060.94}{63}}$ = 48.59

**(ii)**

Coefficient of Variation for Group A= $\frac{S.D}{Mean}×100\%$

S.D for Group A = 81.87

Mean for Group A = 17.83

Therefore, the coefficient of Variation for Group A = $\frac{81.87}{17.83}×100\%$ = 459.17

Coefficient of Variation for Group B= $\frac{S.D}{Mean}×100\%$

S.D for Group B = 48.59

Mean for Group B = 19.51

Therefore, the coefficient of Variation for Group B = $\frac{48.59}{19.51}×100\%$ = 249.05

**(III)**

Group B has a lesser variable distribution than Group A.