ON DEFICIENCY OF ESTIMATORS OF A NORMAL MEAN WITH KNOWN COEFFICIENT OF VARIATION

K. Bhat[1], K.A. Rao[1]

[1]*Mangalore University, Mangalagangotri, India*

Email: *kavitha_karam@yahoo.com*

Many investigations involve the estimation of mean θ. In biological and physical sciences the underlying variable involves measurement and it is reasonable to assume that the underlying distribution is normal. When measurement is taken over a long period of time, the past data indicates a knowledge regarding the population coefficient of variation (CV). CV is fairly stable over time and that can be used to improve the estimation of mean. The application includes the anthropometric measurement of children, estimation of average yield per hectare of major cereals and pulses, estimation in manufacturing industries etc.

When the CV is known, normal distribution no longer belongs to the one parameter exponential family and the distribution is not complete. Therefore uniformly minimum variance unbiased estimator does not exist. In the past, several estimators of the population mean are proposed, which are optimal in a class of estimators. The latest addition to this list of estimators is by Guo and Pal (2003). The maximum likelihood estimator belongs to the class of estimators of the form

$$\tilde{q} = \bar{X}\left\{b_0 + b_1 / \sqrt{V}\right\}$$

where $V = \left(\frac{n}{c}\right)\left(\frac{\bar{X}^2}{S}\right)$, *and* $\bar{X}$ *and* S^2 *denotes sample mean and* var*iance.*

They obtain optimal estimators in certain classes when the loss function is $L\left(q, \hat{q}\right) = \frac{\left(q - \hat{q}\right)^2}{q^2}$. In this paper we derive the deficiency of the maximum likelihood estimator and the members of class of estimators $\tilde{q}$. Numerical values of the deficiency is worked out. Among the estimators compared no estimator is having minimal deficiency for all value of θ.