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Efficacy of rum and country liquor on plasma protein level of *Mus domesticus domesticus*

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Abstract
Apart from alcohol affecting psychological and ethical aspects which are already known, it also has some lesser known effects on certain biochemical parameters like on plasma protein level, serum cholesterol level, blood urea level, blood glucose level, triglycerides level, serum albumin level etc. in the body of animals. Moreover, the effect of other low quality beverages like Rum and Country liquors are also lesser known. An estimation method has been described to find the effect of Rum and Country liquors on plasma protein level of mice. It was found that acute consumption of rum and country liquor had no significant variation in the level but their prolonged use caused depletion in the level of plasma protein.

Keywords: rum, liquor and plasma protein

Introduction
Alcohol consumption is one of the most serious abuse disorders worldwide. It has become evident that over recent years, there has been a steady increase in both average alcohol consumption and the levels of major alcohol related problems. The adverse effect of alcohol on biochemical parameters are less worked out than that of psychological and ethical aspects. In addition, all the previous researchers have taken into consideration of adverse effect of ethanol. They have not studied the effect of other low quality beverages on animals. It, therefore, seems necessary to assess the effect of different variety of beverages like rum and country liquors on biochemical aspects of animals.

Earlier experiments carried out in this direction have led to some definite conclusions, yet they have miles to go in experiment exploring the fact. It in this perspective that the present work has been undertaken. A comprehensive study of the responses evoked in Swiss albino mice *Mus domesticus domesticus* by the application of different types of beverages on biochemical parameters will be worthwhile indeed. This work was undertaken with a view to find out whether different types of alcohol like rum and country liquor applied for different periods could produce any effect on a particular biochemical parameter – Plasma Protein level of *Mus domesticus domesticus.*

The laboratory mice are the most widely used and convenient animal available to a biologist. The scientific name of the common laboratory mouse is *Mus domesticus domesticus*. Till 1981, this was described as *Mus musculus.* The Swiss Albino mice were selected and purchased from Calcutta as well as from Patna of Bihar state. They were reared in a well-ventilated cage with proper supply of food and water. They were left to increase the population. The mice of equal weight and age were selected for the experiment. The mice were divided into the following seven groups: Group A contained ten mice which were used as control and were supplied with usual diet. Group B contained a group of ten mice and they were administered commercial grade of foreign liquor (Rum) with the help of catheter daily for five days. Group C also included ten mice which were treated with rum in the same way and same amount for ten days continuously. Group D consisted of ten mice that were treated with rum in the same manner for fifteen days. Group E contained ten mice of equal age and weight. They were similarly treated with country liquor (commercially called daru consisting nearly 10% ethanol) for five days daily. Group F contained ten mice specimen and were treated with country liquor for ten days. Group G also consisted ten mice and they were treated with same amount of country liquor daily for fifteen days.

Material method

Plasma Protein level was estimated Kieldahl Nesslerization Method. Reagents used are given below: (i) Sodium chloride (0.9 % solution prepared). (ii) Digestion mixture (50 ml of conc. H_2SO_4 poured very slowly into 50 ml of distilled water with constant shaking. Then 1 gm of Potassium persulphate dissolved in the mixture. Mixture then cooled and made upto 100 ml with water). (iii) Nesseler's reagent: two solutions were prepared. (a) 22.5 Gms of iodine dissolved in a solution of 30 gm of Potassium iodide in 20 ml of water; 30 gms of mercury added to it. Mixture shaken well; immersed in cold water from time to time until the supernatant fluid lost all yellow colour due to iodine. Supernatant fluid decanted; few drops tested with 1% starch for presence of iodine; solution diluted to 200 ml and shaken well. (b) Sodium hydroxide (10% solution of sodium hydroxide accurately prepared). (iv) Standard Ammonium sulphate solution: (a) Stock solution (containing 0.3772 gm per 100 ml of solution). (b) Solution for use (5 ml of stock solution diluted to 100 ml with distilled water. Solution contained 18.66 mg per 100 ml or, 4 mg of nitrogen per 100 ml, i.e., 0.04 mg nitrogen per ml).

Mouse blood was extracted from the heart by a plastic syringe and transferred into a vital. The blood was left in the vital till coagulation. 0.2 ml of serum or plasma of the coagulated blood taken in test tube and 10 ml of 0.9% sodium chloride added to it. 1 ml of diluted plasma pipetted out; kept in a hard glass test tube; 1ml of digestion mixture added. The above solution was heated carefully by a micro burner for approx. 10 minutes. Mixture then allowed to cool down; 10 ml of distilled water added; 2 ml of mixture pipetted out and kept in a stopped measuring cylinder. Mixture was made 7 ml with addition of distilled water and 3 ml of Nesseler's reagent added. The optical densities of above two solutions were read in Spectrophotometer using a violet filter having transmission 550 mill microns. The result was finally calculated by the following formula:

$$\text{mg of total plasma protein per 100 ml of blood} = \frac{\text{Reading of unknown}}{\text{Reading of standard}} \times 100$$

Thus, the estimation of Plasma protein was done in control group of mice and again after administration of Rum and Country liquor for five, ten and fifteen days respectively.

Result

In the present study, Plasma protein was estimated in control and rum treated Albino mice. In control group(C) of mice, there was found a little variation in the level of plasma protein. The range of variation was found between 5.641 gm/100 ml and 6.987 gm/100 ml, whereas, the mean variation was recorded to be 6.5312±0.120 gm/100 ml. In five days rum treated mice (T_1), the mean value was found to be 6.0209±0.027 gm/100 ml. Ten days rum treatment further caused significant decrease in the value of plasma protein. The average value of it in this group (T_2) was recorded to be 5.9832±0.127 gm/100 ml. A further decrease in the value of plasma protein was recorded in fifteen days rum treatment. The mean value was found to be 5.5302±0.167 gm/100 ml.

Table 1: Showing the test of significance of plasma protein level of control and rum treated *Mus domesticus domesticus*

Test	Mean	S.D.	S.E.	Comparison value	Variation (in gm/100ml)	T-value
Control	6.5312	0.381164	0.1205346	C-T_1	0.5103	4.1247496**
T_1	6.0209	0.0881702	0.0278818	C-T_1	0.5480	3.1272648**
T_2	5.9832	0.404355	0.1278682	C-T_3	1.0010	4.8498672**
T_3	5.5302	0.5298252	0.1675454	T_1-T_2	0.0377	0.2880677*
(** Significant at 1% P)				T_1-T_3	0.3907	2.8890282**
(* Non- Significant at 1% P)				T_2-T_3	0.4530	2.1493173*

Country liquor also caused a depletion in the value of plasma protein. In control group of mice (C), the mean value of plasma protein was found to be 6.5312±0.120 gm/100 ml. There was found a maximum decrease in its value in five days treated mice. The average value was found to be 5.6733±0.117 gm/100 ml. Ten days country liquor treatment caused a slight depletion in the plasma protein level. The mean value of it in T_2 group was found to be 5.9506±0.018 gm/100 ml. No pronounced change was recorded in fifteen days treated mice with country liquor. The mean value in this group of mice (T_3) was recorded to be 5.938±0.121 gm/ 100 ml.

Table 2: Showing the test of significance of plasma protein level of control and country liquor treated *Mus domesticus domesticus.*

Test	Mean	S.D.	S.E.	Comparison Value	Variation (in gm/100ml)	T-value
Control	6.5312	0.381164	0.1205346	C-T_1	0.8579	5.1052014**
T_1	5.6733	0.3702759	0.1170915	C-T_1	0.5806	3.7296367**
T_2	5.9506	0.3115349	0.0985159	C-T_3	0.5932	3.472084**
T_3	5.9380	0.3828934	0.1210815	T_1-T_2	0.2773	1.8121601*
(** Significant at 1% P)				T_1-T_3	0.2647	1.5715056*
(* Non- Significant at 1% P)				T_2-T_3	0.0126	0.0807195*

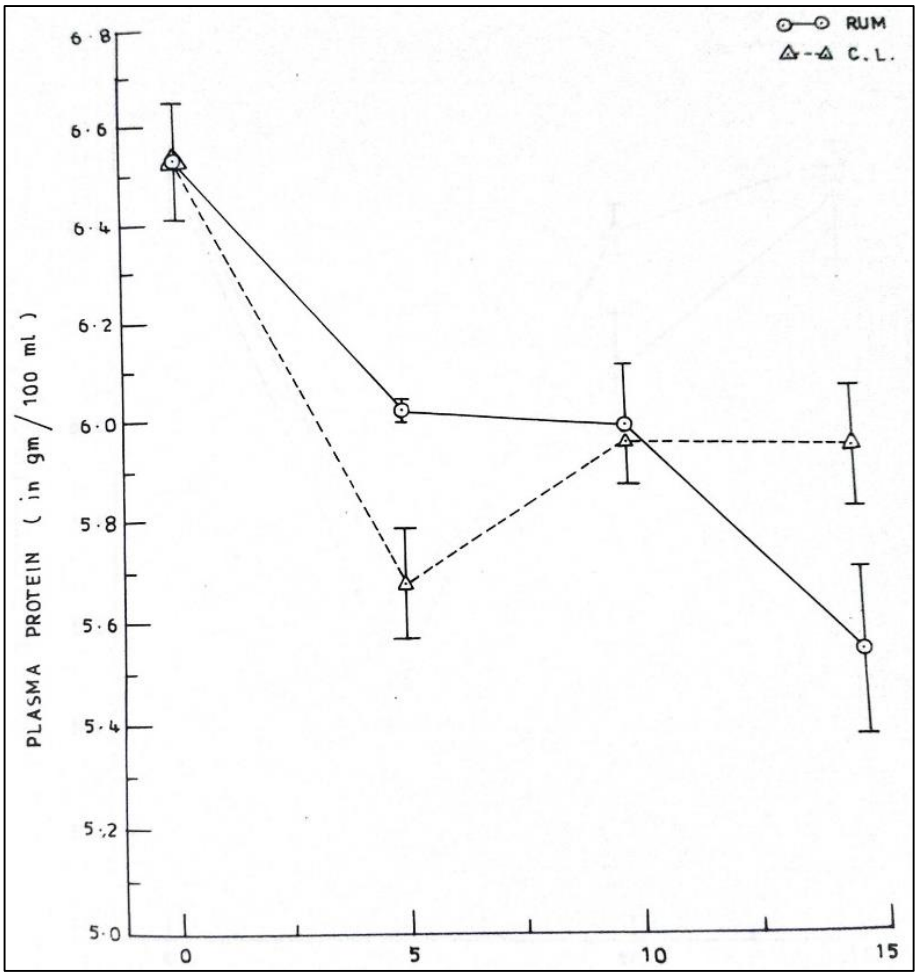

Fig. 1: Showing the effect of Rum and Country liquor on Plasma Protein Level of *Mus domesticus domesticus* Treatment (In days)

Discussion

It was found that in acute condition, no significant variation in the Plasma protein was recorded either in rum or in country liquor treatment but the prolonged use of Rum showed greater depletion in plasma protein than that of country liquor treatment.

The fall in the level of Plasma protein on the effect of Rum up to 15 days treatment might be due to Adrenocorticoid hyperactivity that caused increased protein catabolism leading to gluconeogenesis. The increased metabolic activities of the mice in treated condition might have demanded continual supply of glucose as a source of energy to the nervous system and skeletal muscles and that demand might have been fulfilled by the breakdown of protein into glucose through gluconeogenesis. The depletion in plasma protein might be due to degradation of protein in supplying energy or there may be depletion in protein synthesis.

Summary and Conclusion

Rum treatment caused a gradual and significant depletion in the level of plasma protein at each of the succeeding days of treatment up to 15 days. Country liquor treatment was found less effective than rum. It caused a minor depletion in the level of plasma protein in five days treatment but thereafter, i.e. ten days and fifteen days country liquor treatment caused slight increase in its value but still below the normal value.

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