

Biochemical Changes in Lipid and Carbohydrate Metabolism in Obese Diabetic Male Albino Rats

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The effect of high fat diet on lipid and carbohydrate metabolic changes and the impact of the fatty acids profile on these changes were studied in mature male albino rats. The animals were rendered obese by feeding them a high fat diet for 60 days. Half of fat fed obese rats were rendered diabetic by partially destroying their pancreatic beta cells by injecting them with a reduced dose of alloxan, to produce a Non Insulin Diabetes Mellitus (NIDDM) state. The normal male rats kept on a basal diet. The fat fed rats beside gaining weight showed a significant rise in their hepatic lipid contents which was reflected on their corresponding plasma lipids. They also showed an insulin resistant state manifested by a rise in their plasma insulin and glucose levels. Lipid profile of the omental adipose tissue (OAT) exhibited a significantly higher total lipid content, but lower total cholesterol, triglycerides & phospholipids contents in both obese (non diabetic and diabetic) compared with the normal rats. Unlike the OAT, the brown adipose tissue (BAT) showed a reduced catabolism with a significant rise in its phospholipid contents. Low lipid fraction either in OAT or in BAT was explained by the increased lipolysis in the obese rats resulting from the reduced antilipolytic effect of insulin due to insulin resistance. The increased lipolysis of adipose tissue fat explains the observed rise in plasma fatty acids, which showed a rise in the saturated than the unsaturated fatty acids. Correlation between plasma atherogenic index and plasma fatty acids pattern expressed as P : S ratio showed that in the obese (non diabetic and diabetic) rats it was positively correlated with the P : S ratio. This was ascribed to the fact that in the rat most of the cholesterol is carried with the HDL-C moiety of lipoproteins, unlike in humans where cholesterol is mostly carried with LDL-C. In brief, although this experimental part cannot be exclusively exploited on man owing to the differences in cholesterol carriage between man and rats, this work has shown that dietetic substrates have got their impact on body metabolism, which undoubtedly adds to the genetic constitution of predisposed individuals.

Key words: Obesity, Diabetes, albino Rats.