• *Short Communication*

The Abnormal Proportions of Di-Unsaturated Glycerides in Some Pig Depot Fats

Abstract

The insoluble azelaoglycerides from shark liver oil and pig depot fats contain about 2% each, on fat basis, of resinous monocarboxylic acids of mean M.W. 270–280 which give water soluble magnesium soaps. Those from chicken fat and depot fats of goat, sheep, cow and buffalo contain only 0.0% to 0.8% of this material. When this acid is estimated and corrected, all the above animal fats show proportions of di-unsaturated glycerides equal to or lower than the Glyceride Type Distribution Rule values. The abnormal di-unsaturated glyceride values earlier reported for various pig depot fats were apparently caused by presence of this impurity in varying amounts.

Though more than eighty natural fats have been analyzed by the azelaoglyceride technique, so far only two have been recorded to contain GSU_2 (G,S,U and A stand for glyceryl, saturated acid, unsaturated acid and azelaic acid radicals respectively) in proportions significantly higher than required by the Glyceride Type Distribution Rule (GTDR) (1,2), namely pig depot fats (3) and *Momordica charantia* seed fat (4). It has now been observed that the insoluble azelaoglycerides obtained in the oxidative analysis of fats (5) may contain various types of nonfat impurities both in the monobasic acid (MBA) and dibasic acid (DBA) fractions; methods have also been recorded for estimating many of these (6,7). The presence of small proportions, 1% to 3%, of neutral nonfat matter in the MBA fraction does not affect the values appreciably since there are balancing factors present in the methods of calculation. Similar proportions of nonfat matter in the DBA fraction, however, produces appreciable errors in the calculated proportions of GS_2A and GSA_2. Water insolubles at 2% level (on fat basis) in the DBA fraction will produce a decrease of 3% each of GS_2U and GU_3 and an increase of 6% of GSU_2 in the final analysis, when S and A have mean M.W. around 270 and 188, respectively. This deviation is of the same kind as that shown by the pig depot fats (3) and *M. charantia* seed fat (4).

It is generally believed that higher animal depot fats consist almost exclusively of triglycerides and that no significant proportions of nonfat matter of any type are present. The following animal fats: Shark liver oil, chicken fat, pig depot fats (2 samples), goat depot fats (2 samples), sheep depot fat, beef depot fats (2 samples) and buffalo depot fat were analyzed by procedures wherein all known types of nonfat matter (6,7) are estimated. Particular emphasis was placed on nonfat matter present in the DBA fraction of the insoluble azelaoglycerides. This fraction is designated NFDBA. Chicken fat did not contain any NFDBA. Goat, sheep, buffalo and sheep depot fats contained only small proportions of this, from 0.2% to 0.8%, and further, the proportions showed variations in different specimens from the same biological source.

The results in the case of shark liver oil and pig depot fats were unexpected; both contained 1.8% to 2.0% of NFDBA. This material consisted of reddish viscous acidic matter of mean M.W. around 280 and gave magnesium salts readily soluble in cold water; magnesium salts of higher fatty acids, whether saturated or unsaturated, are insoluble in cold water. The final structure of the shark liver oil (Sm 26.1%) (Sm, saturated acids present, per cent by molecules), after correcting for NFDBA was GS_3 nil, GS_2U 20.6%, GSU_2 36.6% and GU_3 42.8% molecules against 0.0%, 17.9%, 42.5% and 39.6%, respectively, required by GTDR. Before correction, the GS_2U and GU_3 values were about 3% lower and were in good agreement with GTDR values as in the specimen earlier reported (1). In the case of pig depot fat of Sm 43.9%, the final structure after correction was GS_3 4.1%, GS_2U 39.5%, GSU_2 40.7% and GU_3 15.7% molecules against GTDR values of 4.1%, 39.2%, 41.3% and 15.5%, respectively. Before correction, the GS_2U and GU_3 values were 3% below and GSU_2 values 6% above GTDR figures. In the second pig depot fat of Sm 48.0%, the final structure was GS_3 6.9%, GSU_2 44.9%, GSU_2 33.5% and GU_3 14.7% molecules against 6.9%, 43.0%, 37.6% and 12.5%, respectively, required by GTDR. In this case also, the corrected GS_2U and GSU_2 values were 3% higher than the uncorrected. Both shark liver oil and pig depot fat of Sm 48.0% show a small degree of high order compositeness with reference to GTDR as standard (2). This is the first time that high order compositeness is reported in animal fats. On the basis of the present results it is probable that the abnormal proportions of GSU_2 reported earlier for pig depot fats of Sm 37.7% and 39.4% (3) were caused by the presence of NFDBA in somewhat greater proportions than in the instances now studied. A detailed account of the full results will be communicated separately.

Glyceride structure deviations of the above type, however, need not always be caused by errors in analysis due to the presence of NFDBA. An *M. charantia* seed fat of Sm 32.7% was earlier reported to contain GS_3 nil, GS_2U 8.3%, GSU_2 84.3% and GU_3 7.4% molecules, respectively (4). Analysis of a specimen of Sm 27.9% by the present technique gave a structure of GS_3 nil, GS_2U 3.2%, GSU_2 77.4% and GU_3 19.4% molecules against 0.0%, 20.0%, 44.0% and 36.0%, respectively, required by GTDR. The NFDBA amounted only to 0.2%. Seed fat of *Calophyllum floribundum* is another example of this type of deviation observed some time ago in the author's laboratory (unpublished). The fat, Sm

29.4%, showed a final structure of GS_3 nil, GS_2U 12.3%, GSU_2 63.5% and GU_3 24.2% molecules against 0.0%, 21.6%, 45.0% and 33.4%, respectively, required by GTDR. The NFDBA amounted to 1.0% in this case. The reason for the deviation in the case of these two seed fats is not known at present and it is possible that the figures may represent the true glyceride structure. However in cases where such deviations are observed in the future it will be useful to establish that they are not caused by the presence of NFDBA.

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