STUDIES II. EXTRACTION AND DETERMINATION OF VITAMIN A CONTENT OF LIVER OILS OF SOME PHILIPPINE FISHES BY THE DIRECT METHOD

by

S.V. Bersamin,[1/]
L.G. Salcedo[2/] and
G. Guevara[3/]
Philippine Fisheries Commission
Intramuros, Manila, Philippines

ABSTRACT

The preliminary investigation on the extraction and determination of Vitamin A from livers of some Philippine fishes dealt with comparative studies on two methods, namely: direct analysis from fresh liver and analysis of the liver oil. Results revealed that the direct method presents more advantages considering the element of time and cost of production. This study has established the efficiency of the direct method of extraction over that which passes through the oil stage. Result of this investigation will enhance the production of crude fish liver oils for pharmaceutical preparations as sources of Vitamin A, thereby providing the people with low-cost vitamins.

The direct method of extraction of liver oils has Vitamin A values within ranges of 1,573 to 88,687 International Units/g. of oil as shown by the fish species. Of the shark species, the Sharp-Nose and Hammerhead are recommended as Vitamin oil sources whereas the other 2, the Black-finned shark and Atlantic mackerel shark are more suitable for industrial purposes. Intensity of yellow colour is not an index of high Vitamin A content.

INTRODUCTION

The Philippines today is faced with the problem of food shortage. Dietary surveys reveal that vitamin deficiency is common among Filipino families. One of the solutions to this problem is the utilization of fish

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1/ Chief, Fishery Technologist, Chief, Fisheries Utilization Division.
2/ Supervising Fishery Technologist.
3/ Senior Fishery Technologist.

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livers to exploit their potential nutritive, medicinal, and pharmaceutical values. Housewives usually discard the livers with the entrails in dressing fish. Fishermen have no incentives in intensifying shark fishing because of the poor utilization of shark.

Calorimetric determination of Vitamin A have been done by Carr and Price as mentioned by Birosel (1932). The work was based on the measurement of the blue colour formed by the extraction of Vitamin A and antimony trichloride ($SbCl_3$).

Concepcion (1947) commented that biological assays of vitamins are time-consuming and recommends the colorimetric method. However, this method needs extreme care due to the rapid fading of the blue colour, the corrosive nature of $SbCl_3$ and sensitivity of instrument to moisture and interfering substances. Spectrophotometric determination presents more advantages than the colorimetric methods. The former was used in this study.

MATERIALS AND METHODS

The six samples analyzed were purchased from the Navotas fish landing in the fresh state.

The procedures followed in this study were patterned after the same manner as that conducted in the Preliminary Studies on the Extraction and Determination of Vitamin A of Common Philippine Market Fishes by the same authors* except that saponification was done directly on the fish livers and not from the oil. The procedures based on the Methods of Vitamin Assay involved the preparation of the oil by solvent extraction saponification and subsequent extraction of the unsaponified.

Preparation of the oil by solvent extraction: Fish liver oil was extracted from fish livers by the solvent extraction process. Liver samples were homogenized and anhydrous sodium sulphate (Na_2SO_4) was added to absorb excess water from the sample. 100 ml. of fresh oil was extracted from the sample and the per cent oil content was determined.

Saponification: A portion of the fish liver sample was homogenized in a Waring blender and the weighed sample was directly saponified and the unsaponified oil extracted.

About 5 g. of homogenized liver was refluxed in a mixture of 5 ml. of 50% KOH and 30 ml. C_2H_5OH for 30-60 minutes depending on the nature of the sample (test for complete saponification).

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* Technical Paper (IPFC/C62/TECH 36) read at IPFC 10th Session, Seoul, Republic of Korea, 10-25 October 1962. Also IPFC Current Affairs Bulletin, No. 37, August 1963.

Extraction: After saponification, the resulting mixture was transferred into a separatory funnel with anhydrous ether three times to extract completely the unsaponified matter. The ether extract which is the unsaponifiable portion was washed with distilled water until the washings were free from alkali. This was determined by testing with Phenolpathalein. After the removal of the final water, the ether extract containing Vitamin A was filtered through anhydrous Na_2SO_4 into a 250 ml. flask. The water-free filtrate is the pure unsaponified oil.

Spectrophotometric analysis: The Vitamin A of the unsaponified oil of the liver samples was determined by the direct spectrophotometric analysis through a Beckmann spectrophotometer.

RESULTS AND DISCUSSION

Table I shows the percent oil and Vitamin A content of extracted oils directly from livers of various species.

The direct method of extraction of liver oils has Vitamin A values within ranges of 1,573 to 88,687 International Units/g. of oil as shown by the fish species. Of the shark species, the Sharp-Nose and Hammerhead are recommended as Vitamin oil sources whereas the other 2, the Black-finned shark and Atlantic mackerel shark are more suitable for industrial purposes.

Intensity of yellow colour is not an index of high Vitamin A content.

CONCLUSION

Certain species of shark and other Philippine fish species yield liver oils which contain appreciable amounts of Vitamin A as determined by the Direct Method.

Results of this study will provide incentives for intensification of shark fishing, encourage housewives to utilize livers of market fishes in menu preparations.

Considering that the shark resources in our waters are practically untapped and the feasibilities of a full industrial utilization of the shari body, this particular type of fishery presents budget prospects.

Table I

Vitamin A Potency of Liver Oils of Some Philippine Fishes

Name of Fish	Length of Fish, cm.	Weight of Fish, kg.	Oil Extracted	Oil Content, %	Vitamin A International Unit/g. of Oil
1. Black-finned shark *Carcharias melanopterus* (Quoy and Gaimard)	62.3	3	Fresh oil Unsaponified oil	29.22 2.70	626.46 6,779.71
2. Atlantic mackerel shark *Isurus glaucus*	240.0	100.8	Fresh oil Unsaponified oil	67.28	383.36 29,310.22
3. Hammerhead *Sphyrna zygaena* (Linnaeus)	91.44	3.7	Fresh oil Unsaponified oil	28.74 4.75	4,630.31 28,615.80
4. Sharp-nose *Scoliodon palasorrah* (Cuvier)	142.24	11.9	Fresh oil Unsaponified oil	36.85 1.73	3,685.00 61,994.00
5. Guitarfish *Rynchobatus djiddensis* (Forskal)	58.42	1.2	Fresh oil Unsaponified oil	4.97 2.72	800.96 1,673.16
6. Tuna *Neothunnus macropterus* (Schlegel)	48.8	2.4	Fresh oil Unsaponified oil	1.16 1.14	67,894.00 88,697.00
7. Short-bodied mackerel *Rastrelliger brachysomus* (Bleeker)	17.9	0.667	Fresh oil Unsaponified oil	1.57 1.947	14,774.00 24,494.00

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