Establishment of Anti-obesity and Anti-inflammatory Potentiality of Conjugated Fatty Acid Isolated from Marine Phasa Fish (*Setipinna phasa*) Oil on *in-vivo* and *in-vitro* Model

Obesity is a major public health problem day by day due to unhealthy eating habit. The buildup of an excessive quantity of bodily fat is the complex condition known as obesity. It is a condition that develops when energy intake and expenditure are out of balance. Inflammation and hypertrophy are caused by storage of too much white adipose tissue resulting adiposity, which also secreted several pro-inflammatory cytokines. Several marketed drugs of obesity management have many side effects for long time ingestion. Anchovy, Gangetic Hairfin despite being a fresh water fish and going by the name "Phasa," (*Setipinna phasa*), is thought to be able to tolerate some saline in the water. Basically, it can be found in Orissa's River and estuaries as well as the Ganges system. The fish is easily available, low cost, and popular in West Bengal and Orissa. Considering this, it is aimed to establish the anti-obesity effect of marine Phasa fish (*Setipinna phasa*) oil against obese model. For the establishment of this research, Extraction, Isolation of *Setipinna phasa* fish oil were done by FAME (Fatty Acid Methyl Extraction) procedure and characterization of fish oil extracted from *Setipinna phasa* with a gas chromatography mass spectrometer and to check the edibility of fish oil physicochemical characteristics were done. Establishment of anti-obesity and anti-inflammatory effect of fatty acid isolated from marine *Setipinna phasa* fish oil on *in-vitro* model. Here I have chosen 3T3-L1 preadipocyte cell line for this study. I have treated the cell with 11,14,17-ITA. Investigation of the anti-obesity and anti-inflammatory effect of marine *Setipinna phasa* fish oil on high fat diet induced *in-vivo* model: selection of most effective dose of *Setipinna phasa* fish oil. For the investigation of the anti-obesity and anti-inflammatory effect of marine *Setipinna phasa* fish oil on high fat diet induced in-vivo model: A time dependent study of *Setipinna phasa* fish oil to select most effective duration. Establishment the mechanism of anti-obesity effect of isolated fatty acid through transcriptional and translational alteration: a dose dependent study of 11,14,17-ITA were done in male albino mice. By using GC-MS, several fatty acids were characterized from *Setipinna phasa* oil like EPA, DHA, methyl linolenate, hexadec-9-enoic acid, and octadec-11-enoic acid. A GC-MS investigation investigated the existence of fatty acids that are good for human health as well as obesity and for evaluation the anti-obesity effect different parameters would be considered as Body weight, total lipid profile and different obesity and obesity associated inflammatory markers. The Physicochemical characteristics of Phasa fish

oil revealed that oil quality was good. Application of Phasa fish oil on high fat diet induced obese mice significantly reduced body weight, serum lipid profile compared to obese group. Several adipocytokines are downregulated and upregulated which indicated the potentiality of this oil and essential fatty acid. From this study it was also demonstrated that the pathway of the fatty acid and marine fish oil exactly worked as anti-obesity. It is much conspicuous that Phasa fish oil, enriched with essential fatty acid might be used as an anti-obese and anti-inflammatory supplement.

Keywords: Adiponectin, Fatty acid, Leptin, Obesity, Anti-inflammatory, Phasa.