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Determination of Heavy Metals in Selected Meat and Meat Products from Meat Market of Singrauli

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Abstract: *The presence of heavy metals such as cadmium and chromium in meat and meat product may cause harm to people since they are part of their everyday diet. In this study, (09) nine different meat sample (Composed of raw, ground and processed) were taken and measured quantitatively with the help of flameless atomic absorption spectrophotometer. In this study it was found that the cadmium content is within the limit while chromium content also found within the limit. But there is no standard limit set by the United States environmental protection agency, in case of chromium content.*

Keyword: *Meat, meat product, raw meat, ground meat, processed meat, heavy metals toxicants.*

I. Introduction

Several hazardous chemicals have been introduced into the environment which significantly can contaminate waters and may accumulate in soil in the various incorporate forms. Plant, which take up nutrients in soil also absorb such toxicants (hazardous chemicals) since plants play a major role as producer in the food chain. The introduction of such chemicals into the environment then affects animals, including those that are source of meat. In farms, pesticides, organic chemicals and heavy metals may be introduced into the food stuff used. Other sources of toxicants are also present in the form of the facilities that house these animals in the tools used in the silos and in feeding trough. Hazardous chemicals are also present in the environment of slaughterhouses and retailers, distributers [(2)(7)]

II. Objective

(i) To perform quantitative determination of heavy metal such as cadmium and chromium in the meat and meat product available in the meat market of waidhan and Singrauli area.
(ii) the result so obtained compare with the standard limit fixed by USEPA (united state environment protection agency)
(iii) In state of result obtained contrary to that of standard of USEPA, then gen. people awareness scheme shall be launched by us at local labels'

III. Importance of the Study

According to (NNMB) national nutrition monitoring bureau of (NIN) national institute of nutrition Hyderabad India which work under the aegis of (ICMR) Indian council of medical research, ministry of health and family welfare govt. of India which recommended daily allowance of meat as 34 gram per day while meat consumption in India is as low as 14 gram per day . Although the meat consumption is growing day by day it may high in some places and low in other places.

Thus monitoring the quality of meat and meat product is vital for ensuring its safety as for as health is concerned .Although certain policy about meat regulation are available with the recommendation of ICMR.

However specific study for specific places regarding periodic testing of toxicants such as heavy metals in the marketed meat has never been neither existed nor done. Thus this study can benefit the consumer by ensuring meat safety and for the government to closely monitor regulation about meat products.

IV. Materials and Method

The whole study done in the departmental lab of chemistry SGS Gov. PG. College Sidhi and certain spectroscopic datas has been taken from MANIT BHOPAL India .All the samples collected from meat market of Waidhan and Singrauli.

In the study, three groups of samples were taken for Analysis Gr.1st: Raw meats – three samples 1- pork flesh 2- chicken flesh 3- beef flesh Gr.2nd:- processed meat – three samples 4- Tocino 5- tapa 6- ham Gr.3rd:- ground meats three samples 7-ground chicken 8 – ground pork 9 – ground beef. Selection of samples done on the basis of cost and availability.

Fine grams of each of the different meat samples were digested in 10 ml. concen nitric acid in an open glass container for overnight at room temp and on the next day at 80°c for 06 hours, then it was cooled to room temp, and the volume was adjusted to 50 ml. with distilled water, the solution to obtained was subjected to flameless atomic absorption spectrophotometer (FAAS) at the laborite of MANIT (Maulana Azad National institute of technology) Bhopal for the further quantitative determination of heavy metals presence in the samples.[6]

V. Result and Discussion

The samples classified into three groups i.e. raw meat, ground meat and processed meat, the raw meat included uncooked flesh of the animal, the ground meat included raw meats that were processed through grinder, which are also available in the market. This group of meat was included in the chosen sample to determine whether the process of grinding can contribute to the contamination present in the raw meats and the processed meat were the flavored meat usually available as marinated or pretreated meat.

Heavy meats presence in the samples such as cadmium and chromium was identified and quantified using flame atomic absorption spectrophotometer (FAAS) this analysis involved the decomposition of sample into atoms by heating them to quite high temp. Often several thousand degree Kelvin then the absorption or emission of ultraviolet or visible radiation by these atoms may then by measure. The advantage of FAAS is it is highly sensitive and can analyze many element in complex samples for cadmium and chromium its approximate sensitivity in 0.05 parts per million and 0.25 parts per million respectively. [5]

The data obtained has been summerized in table -1 according to table all of the samples have acceptable limit that is below 0.05 for the cadmium content according to the limit fixed by (USEPA) united states environmental protection agency. And for the chromium content it in high than that of cadmium in all the sample, might be because of Chromium exist in two forms the Cr VI and Cr III, chromium VI is the form which can pose hazard to health while chromium III is naturally present in some foods such as vegetables, fruits, grains, yeast and meat and it is considered as essentials nutrient. Thus there is a possibility of that this was present in the samples.

The importance of determining the amounts of heavy metals in meat and meat product has been pointed out in several studies as a result of the growing concern on the rise of environmental pollution.

The various literature in this regard reveals that the heavy metals enter into the human body through inhalation or ingestion (Tripathi et all in Mumbai India) [4]

It is noted that the meat becoming a part of diet day by day hence it become necessary to make proper study in this field too.

Several studies also reveals, where comparison done of presence of heavy metals with that of other food stuff such as fish and vegetables.

The study conducted in Turkey and in China, which reveals, the presence of cadmium in fish (0.8367 meg/100g) in meat (0.8167 meg/100g) chromium in fish (8.61meg/100g) in meat (8.94meg/100g) and in china it reveals that the dietary intake of heavy metals in adult per day meat accounted 6.05% lead 4.93 meg/day cadmium (o.319meg/day) [3]

Bioaccumulation is an important factor in heavy metal toxicity since this study made use of lean meat. Values observed are result of bioaccumulation of the respective heavy metals in edible muscles. According to the study undertaken by karm' arov a at al. Chicken have high accumulation of lead and by kabata pendios and mukherji also reported high amount of lead in chicken muscle (0.5 mg/kg) hence the health risk is also related with consumption of other heavy metals such as cadmium and chromium in chicken muscle, liver and other meat product should not be neglected.[1][8]

Table -1

Sample		Cadmium content		Chromium content	
		Parts per million (PPM)	Remark Limit (0.05)	Parts per million (PPM)	Remark No. Limit Fixed by USEPA
Raw Meat	1	0.0089	Below Limit	0.3124	-
	2	0.0083	Below Limit	0.3541	-
	3	0.0047	Below Limit	0.2545	-
Ground Meat	1	0.0039	Below Limit	0.0011	-
	2	0.0099	Below Limit	0.2171	-
	3	0.0030	Below Limit	0.1826	-
Processed Meat	1	0.0088	Below Limit	0.2731	-
	2	0.0043	Below Limit	0.2132	-
	3	0.0092	Below Limit	0.2474	-

VI. Conclusion and Recommendation

Since the meat and meat product contains acceptable level of cadmium and high level of chromium, hence there is no issue of alarming situation in the area where study done. The limit for chromium content in food has not been fixed by either USEPA or by other statutory body of our country yet.

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