



## **A Short Study on Meat Allergy**

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### **ABSTRACT:**

Red meat is an important part of the human diet as it contains high-quality proteins, healthy fatty acids, and several micronutrients that promote good health. Red meat allergies were first recorded in 2009 in the US, by 2021 the number had increased to 34,000. The study was conducted to know the prevalence of red meat allergies in different regions through a Google form. The data was analyzed and differentiated. Most red meat allergies are due to mutton, fish, beef, chicken, pork, etc., and most people are developing fresh red meat allergies. So from this study, we concluded that most of the red meat allergies are increasing annually due to poor hygiene and improper cooking practices and mostly individuals with low immunity are highly prone to meat allergies.

**KEY WORDS** – red meat, allergic reactions, primary beef allergy, pork-cat syndrome, and  $\alpha$  - Gal syndrome.

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### **I. INTRODUCTION**

Red meat is an important part of the human diet as it contains high-quality protein, healthy fatty acids, and several micronutrients that promote good health.<sup>[1]</sup> Red meat refers to cattle, pork, and sheep, whereas processed meat is defined as meat that has been preserved using processes other than freezing, such as salting, smoking, marinating, or heating, such as ham, bacon, sausages, hamburgers, salami, corned beef, and canned meat.<sup>[2]</sup> Red meat contains a wide range of macronutrients, including a significant amount of biologically valuable protein with all eight vital amino acids essential for adults and children. Protein is required for the growth, maintenance, and repair of the body. Red meat has 20-24 g of protein per 100 g (when uncooked) and is thus considered a high-protein source. Red meat has a broad spectrum of bioavailable micronutrients that are essential for overall health and well-being.<sup>[1]</sup>

Red meat's lean component contains<sup>[3]</sup>

- High-quality protein, vitamin B12, niacin, vitamin B6, iron, zinc, and phosphorus.
- It contains long-chain omega-3 polyunsaturated fats, riboflavin, pantothenic acid, selenium, and perhaps vitamin D.
- Extremely low in fat and salt.
- Taurine, carnitine, carnosine, ubiquinone, glutathione, and creatine are some of the endogenous antioxidants and other bioactive compounds.

## II. EPIDEMIOLOGY

In the United States, red meat allergies were first recorded in 2009, with 24 cases. By 2021, the number of reported cases had risen to 34,000.

There was a 32% increase in occurrences of red meat allergy in the southeastern United States, where Lone Star ticks are prevalent. These insects' bites may cause red meat sensitivities.

It is currently estimated that up to 3% of the US population is allergic to red meat.

## III. TYPES OF RED MEAT ALLERGIES:

The three main types of IgE-mediated red meat allergies: <sup>[5]</sup>

1. primary beef allergy,
2. pork-cat syndrome, and
3.  $\alpha$ -Gal syndrome.

Primary beef allergy is most typically reported in young atopic children. The best-studied allergen in primary beef allergy is bovine serum albumin (Bosd 6), but additional epitopes, such as bovine immunoglobulin (Bos d 7), have also been discovered as IgE targets. <sup>[5]</sup>

Pork-cat syndrome is a rare condition that occurs in persons who are allergic to cat epithelium and exhibit symptoms suggestive of IgE-mediated hypersensitivity after consuming pork meat. These symptoms include urticaria with or without angioedema, as well as potentially lethal anaphylaxis. <sup>[6]</sup>

Alpha-gal Syndrome (AGS) is an allergy to non-primate mammalian meat and its derivatives caused by tick bites. It is caused by a particular IgE antibody to the oligosaccharide galactose- $\alpha$ -1, 3-galactose (alpha-gal). <sup>[7]</sup>

Other than red meat chicken may also cause allergic reactions. An unfavorable immunological reaction following the ingestion of chicken or its derivatives is known as a chicken allergy. Although rare, this allergy can give patients painful symptoms. Egg allergies are often associated with chicken allergies. This implies that certain individuals who have an allergic reaction to eggs will frequently have the same symptoms while consuming chicken. We call this the "bird-egg syndrome." Alpha-livetin, another name for chicken serum albumin, and a chemical present in egg yolks are the causes of this disease in those who have it. <sup>[8]</sup>

## PATHOPHYSIOLOGY:

A complex interaction between various inflammatory cells, such as mast cells, basophils, lymphocytes, dendritic cells, eosinophils, and occasionally neutrophils, results in allergic inflammation. Several inflammatory mediators, such as lipids, purines, cytokines, chemokines, and reactive oxygen species, are produced by these cells. Target cells that are affected by allergic inflammation include fibroblasts, airway smooth muscle cells, vascular cells, and epithelial cells. These cells are a major source of inflammatory mediators. During allergic inflammation, sensory nerves become sensitive and stimulated, resulting in symptoms. Specifically, NF- $\kappa$ B and GATA3 are two of the transcription factors that regulate allergic inflammatory responses. Histone alterations and DNA methylation are two other epigenetic processes that control the expression of inflammatory genes. Many endogenous anti-inflammatory systems, including cytokines and anti-inflammatory lipids, may be disturbed in allergic diseases, exacerbating and prolonging the inflammation. <sup>[9]</sup>

Allergen sensitization is a necessary step in the onset of allergy. The body's mucosal surfaces contain antigen-presenting cells, such as dendritic and macrophage cells, which are responsible for recognizing allergens. When an allergen comes into touch with persons who are prone to the condition, their antigen-presenting cells regard it as an intruder. Next, the antigen-presenting cell absorbs, processes, and displays the allergen on its surface. The allergen is subsequently presented by this cell to the T-lymphocyte (T-cell), which prompts the B-cell to make antibodies that are particular to the allergen. Following their release, these particular antibodies, known as IgE,

bind to high-affinity receptors on the surface of basophils in the blood and mast cells on mucosal surfaces. Following the preceding period of sensitization, there is a latency period, during which the allergic reaction is triggered upon subsequent re-exposure to the allergen. The allergen forms a cross-link with the IgE on the mast cell or basophil surface, causing the cell to "degranulate" or release inflammatory mediators. Histamine is the main mediator among them, along with prostaglandins, kinins, and cysteinyl leukotrienes. Considering how they cause symptoms in various organs, they act differently.<sup>[10]</sup>

### **SYMPTOMS:**

When compared to other food allergies, the symptoms of an alpha-gal allergic reaction typically take longer to appear.

Alpha-gal syndrome symptoms can include:<sup>[11]</sup>

- Itching, hives, or scaly, irritated skin.
- Lip, cheek, tongue, throat, or other body part swelling.
- Breathing difficulties or wheezing.
- Vomiting, diarrhea, upset stomach, or stomach pain.
- Heartburn or indigestion
- Dizziness or faintness

### **AIM:**

- To identify the allergic reactions associated with meat.
- To determine which type of meat cause the most allergic reactions.

### **OBJECTIVES:**

- To identify the allergic reactions associated with meat.
- To identify the recovery rate after allergic reactions.

### **MATERIALS AND METHODS:**

The study was carried out in a group of population using Google Forms in Telangana, India. This was a retrospective observational study. We have analyzed 401 people and the data was collected and interpreted.

### **SOURCES OF DATA:**

We gathered all the relevant and necessary data from Google Forms.

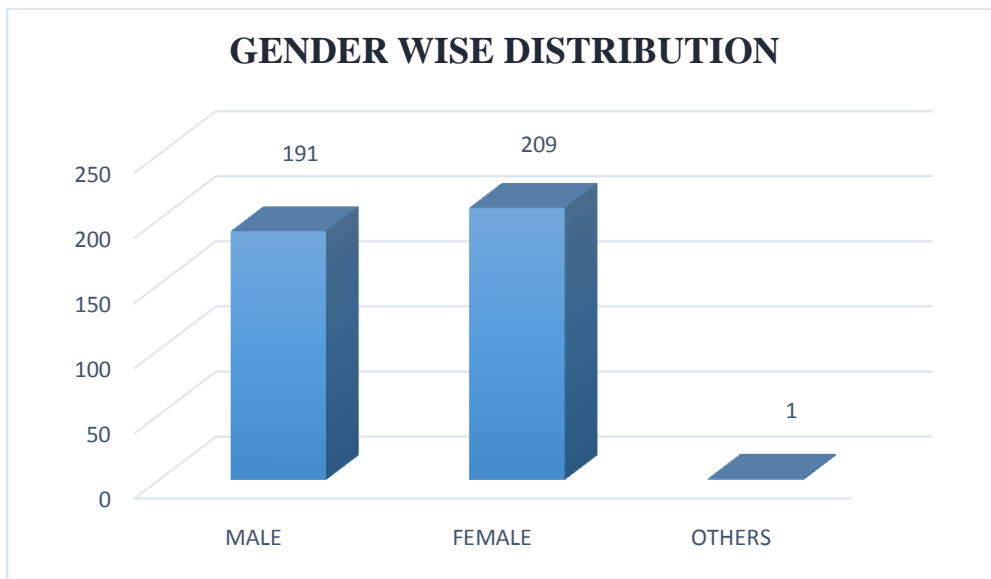
### **FORMS INCLUDED IN THE STUDY:**

- Subject details (such as name, age, gender)
- Google Forms – Data Collection Form

### **STUDY PROCEDURE:**

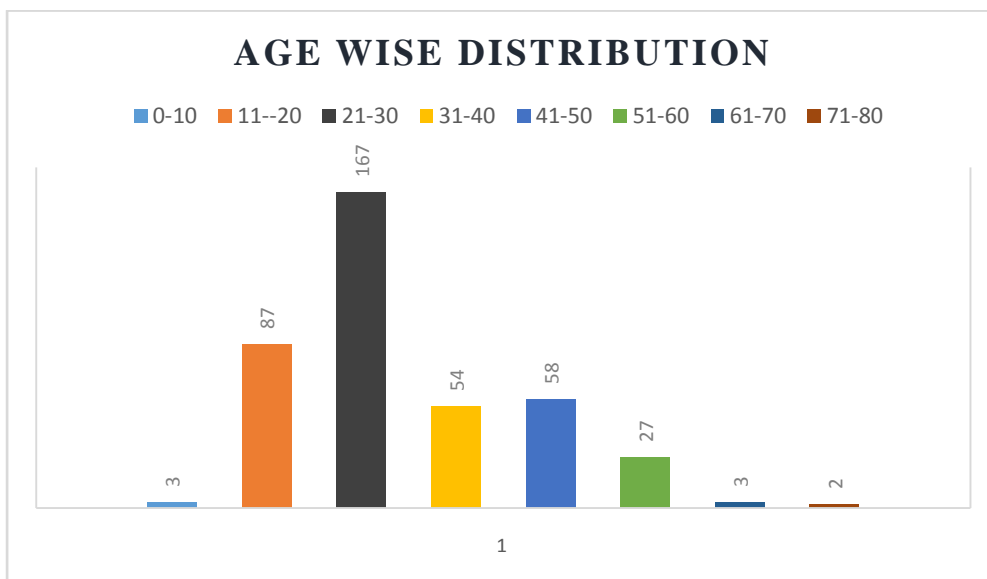
1. A Google form was created based on previous research articles.
2. In a group of populations samples were collected randomly.
3. Subjects' responses were recorded in the google form.
4. The data gathered from the 401 subjects throughout the period were examined.
5. The data was entered in Microsoft Excel, and the results were analyzed and interpreted.

#### IV. RESULTS



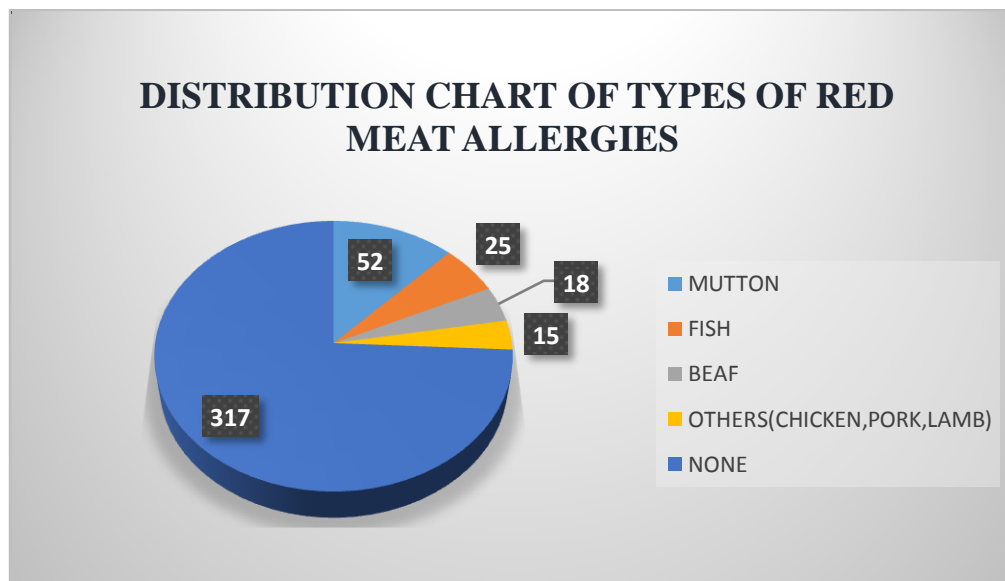
**Fig 1 – Gender wise distribution of red meat allergy**

Among the total 401 subjects, 191 are males while 209 are females and 1 are others.



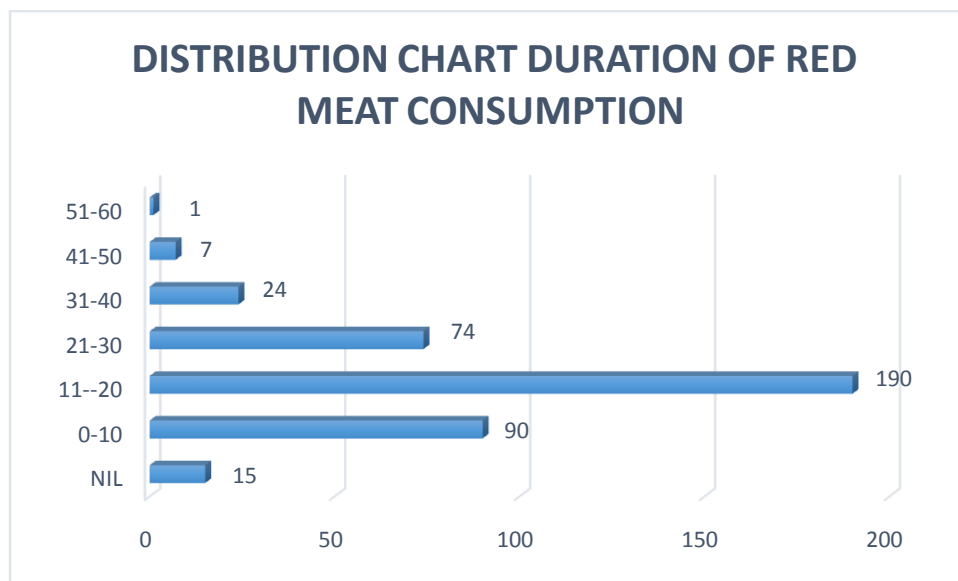
**Fig 2 – Age-wise distribution**

Among a total of 401 subjects, most of the subjects are in the age group of 21-30 years.



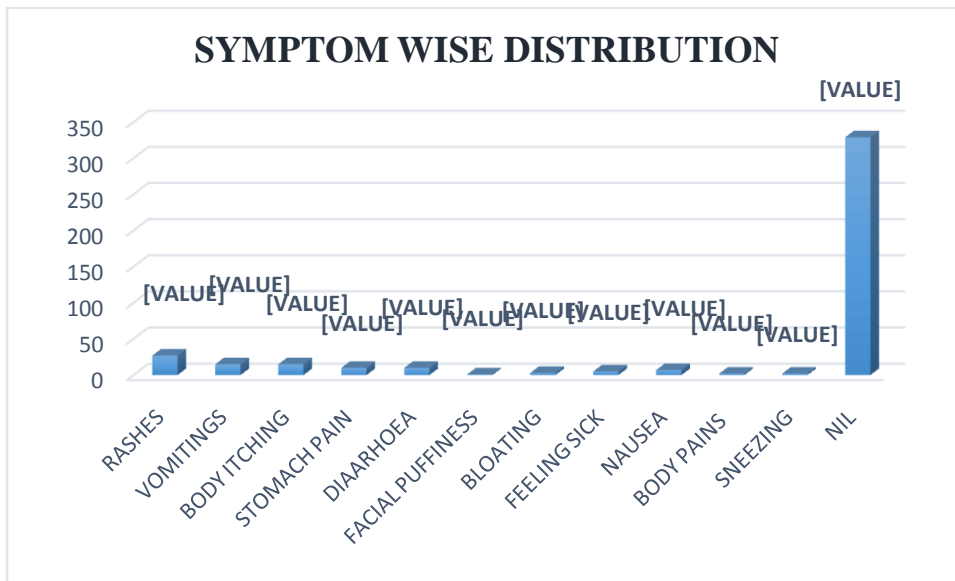
**Fig 3 – Distribution chart of types of red meat allergies**

Among 401 subjects, 12% of subjects have an allergy to mutton, 6% to fish, and 4% to beef and others respectively.



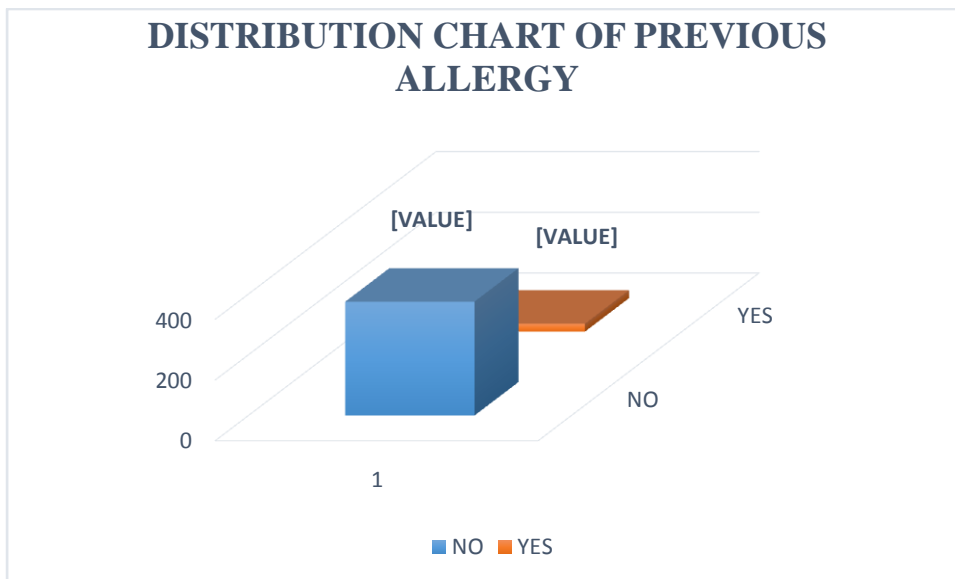
**Fig – 4 Distribution chart of the duration of red meat consumption**

Among 401 subjects, most of the subjects started consumption of red meat in the age group of 11-20 years



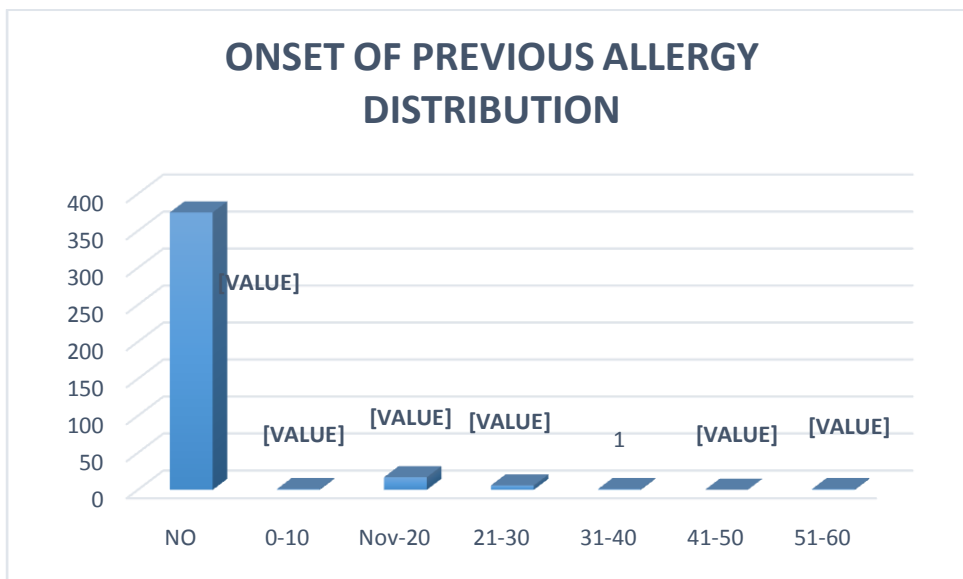
**Fig – 5 Symptoms-wise distribution chart**

Among 401 subjects, 329 subjects have no symptoms and the remaining subjects are experiencing several symptoms



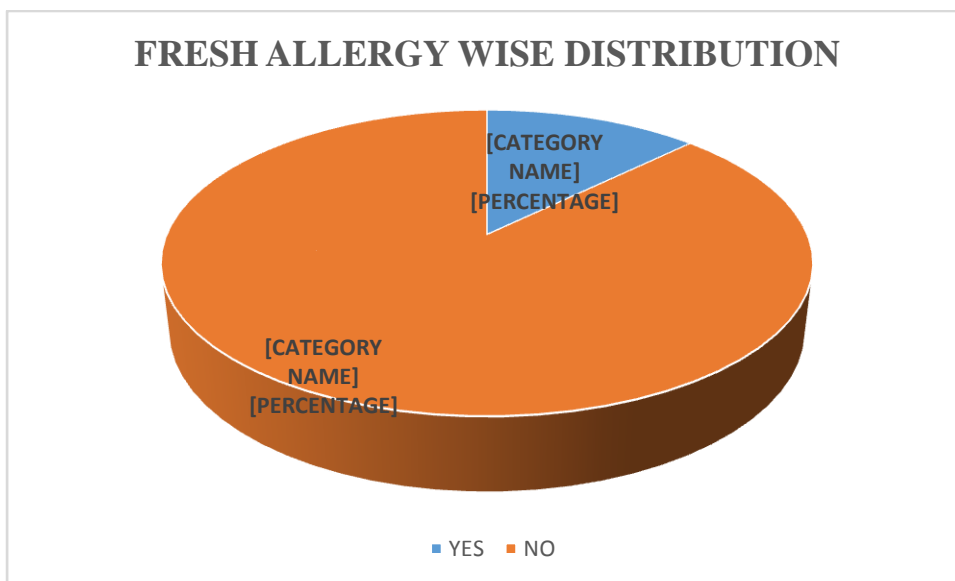
**Fig – 6 Distribution chart of previous allergy**

Among 401 subjects, 19 subjects have previous allergies



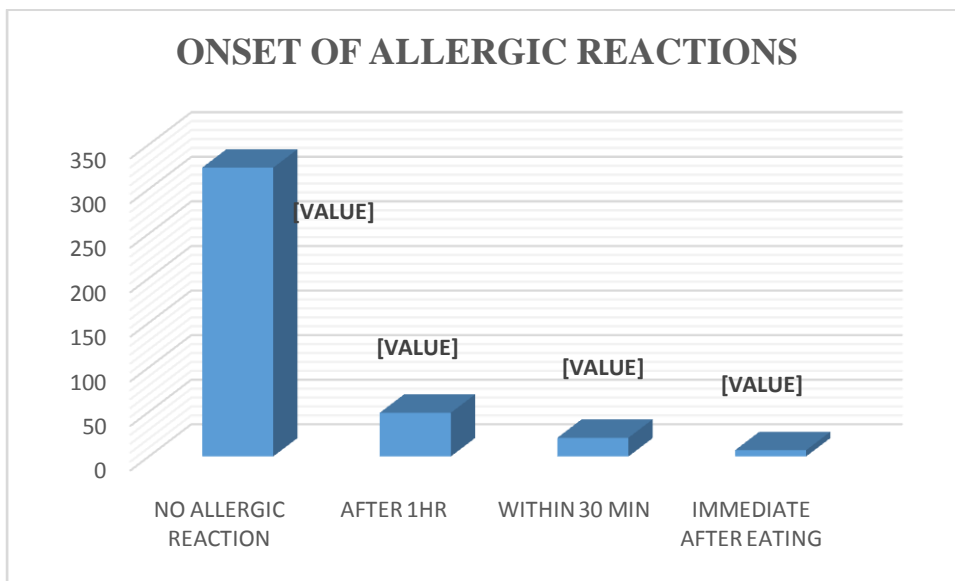
**Fig – 7** Distribution chart of onset of the previous allergy

Among 401 subjects, 375 subjects have no allergies and most of the subjects had onset of previous allergy at the age of 11-20 years



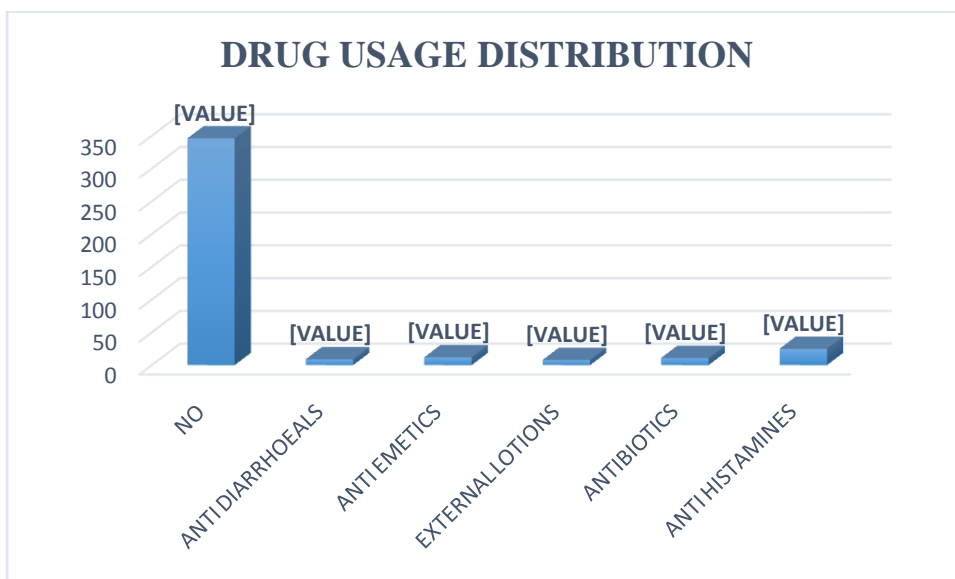
**Fig – 8** Distribution chart of fresh allergy

Among 401 subjects, 51 subjects have fresh allergy complaints



**Fig – 9 Distribution chart of onset of an allergic reaction**

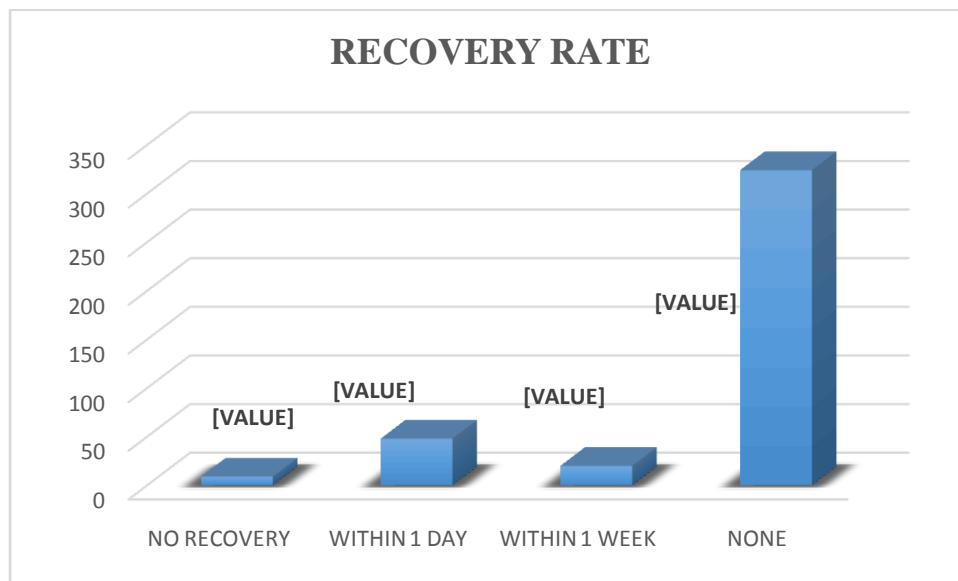
Among 401 subjects, 49 subjects are having allergic reactions after 1 hour of consumption 21 are within 30 min and 7 are experiencing immediate after eating



**Fig – 10 Distribution chart of drug usage**

Among 401 subjects, most of the subjects are using antihistamines, anti-emetics, antibiotics, anti-diarrhea, and external lotions respectively.





**Fig – 11 Distribution chart of recovery rate**

Among 401 subjects, 48 subjects recovered within 1 day, 20 within 1 week and 9 subjects had no recovery.

## V. DISCUSSION

Nowadays red meat allergies are increasing because of improper cooking of non-vegetarian and poor hygiene. The red meat allergies cases are increasing day by day. In our study out of 401 subjects, 77 subjects experienced allergic symptoms. People who have meat allergies experience symptoms such as rashes, vomiting, body itching, stomach pain, diarrhea, facial puffiness, bloating, feeling sick, nausea, body pains, and sneezing. Where persons consuming mutton are experiencing most of the allergies. The duration of people experiencing allergic reactions is between immediately after eating to 1 hour and taking symptomatic treatment. The recovery rate of most of the subjects is within 1 day. Our main motto of study was to identify which type of meat is causing the most allergic reactions and to identify allergic reactions associated with meat.

## VI. CONCLUSION

According to our study, red meat allergies are rising annually as a result of inadequate hygiene and improper non-vegetarian cooking practices across different locations. Compared to the general population, individuals with low immunity are particularly affected by allergic reactions.

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