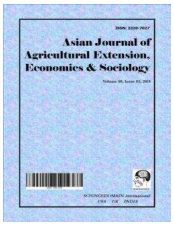

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Assessment of Existing Meat Handling and Hygienic Practices among Butchers and Meat Retailers in Jammu District of Jammu and Kashmir: A Socio-Economic Analysis*

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Authors' contributions

This work was carried out in collaboration between all authors. Author RAB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SAK guided the author RAB during whole research period and edited the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

The present study was conducted in Jammu district of Jammu and Kashmir State to study the assessment of existing meat handling and hygienic practices among butchers and meat retailers in Jammu District of Jammu and Kashmir. Three slaughter houses of Jammu district situated at Nagrota, Old Rehari and Gujjar Nagar were selected for the study. Ten butchers from each slaughter house were selected. Thirty retail meat shops were selected and from each randomly selected retail meat shop, one meat retailer was selected. Thus, a total of thirty butchers and thirty meat retailers were selected for the study. Data was collected through a well structured interview

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schedule. The data was coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean and standard deviation were worked out for meaningful interpretation. Transport of animal to be slaughtered was not carried out properly. Animal were fatigued and soiled with faecal material and considerations were not given to avoid undue stress that might adversely affect the safety and suitability of meat. There was no standard method of bringing the animal to the floor for slaughter. The animals were slaughtered without restraining them properly and are slaughtered in front of other animals causing great fear in them. Butchers used to bring even more than ten animals at a time and slaughter them one after other, even butchers and other workers moved freely over carcasses without caring for hygienic measures. Animals were slaughtered (by both Halal and Jhatka method) and dressed in unhygienic way. Butchers do not care for preventing the intestine from puncturing during evisceration which leads to contamination of carcass. The edible offal's pluck (heart, lungs, trachea and esophagus) were pulled out as a unit and these were not hung on a hook instead it was place on floor, similarly paunch (stomach and intestines) were also dropped on floor. Meat retailers apart from selling meat from animals slaughtered at slaughter houses significant proportion of respondents were also slaughtering animals (mostly sheep and goat) at their own retail meat shops. Chicken were exclusively slaughtered at retail meat shops in front of the consumers. Personal hygiene was poorly maintained by meat handlers owing to their illiteracy, unawareness, lack of facilities and nature of work.

Keywords: Butchers; evisceration; hygienic; meat retailers; paunch; pluck; slaughter.

1. INTRODUCTION

India with its 190 million cattle, 108 million buffaloes, 135 million goats, 65 million sheep, 10.29 million pigs and 729 million poultry is a potential meat producer in the world. India possesses largest cattle and buffalo population in the world. The goat population is second to China, while sheep population is third, after China and Australia. India ranks 1st in milk production, 3rd in fish production, 5th in meat and egg production and 6th in broiler production in the world [1]. India has 11.60% of world livestock population and is 5th in meat production in the world by producing over 8.89 million tones of meat which is 2.21% of world meat production. The contribution from buffalo, cattle, sheep, goat, pig, poultry and other species is about 23.33%, 17.34%, 4.61%, 9.3%, 5.31%, 36.68% and 3.37% respectively, to meat production in India [2]. It was noticed that about 8% cattle, 10.6% buffalo, 24.1% sheep, 58.7% goat and 95% pig are slaughtered each year [2].

Despite India getting huge wealth from livestock and its uniqueness of number and diversity of meat animal species, meat and meat products are treated as the byproducts of animal husbandry. The entire gamut of meat production, processing and marketing is neglected in the country and current state of affairs is forcing the consumer to shift towards other nutritive and hygienic product. Meat is an important source of protein and a valuable commodity in resource poor communities. In many developing countries, lack of appropriate slaughtering facilities and unsatisfactory slaughtering techniques can cause unnecessary losses of meat as well as valuable by-products from animal carcasses [3]. Access to good quality, safe and nutritious food is considered as basic right of the people, and illness resulting from the consumption of foods has been a basic problem for consumers. Even more recently, despite a continuous increase in demand, the image of animal products has been tarnished by the risk of meat borne diseases. Globally, food borne illness is a growing public health problem because of increasing global trade in food, changes in the way food is produced and changes in the consumer's requirements. These changing pattern cause new challenges in the way of food safety management. About, 75 percent of the new communicable diseases that affected humans over the past 10 years have been caused by pathogens originating from animal or from products of animal origin. Many of these new human diseases are called zoonotic diseases which are associated with handling of diseased domestic and wild animal, slaughtering, meat cutting, retailing and processing.

Lack of empirical studies on butchers, meat handlers and retailers are some of the major causes hampering any effort to bring desirable change in the availability of hygienic meat to

consumers. People who are dietary conscious are willing to pay good amount of money for quality meat and meat product. Consumers in both developed and developing countries expect quality meat, a broad diversity of meat cuts, more ease in preparation and enhanced assurances of safety [4]. Thus, adoption of good hygienic and sanitary practices by personnel engaged in unorganized meat production will improve safety and suitability of meat which will lead to increased marketability and consumption, finally resulting into better socio-economic status of all personnel engaged either in animal rearing, trade or processing of meat.

2. MATERIALS AND METHODS

The present study was conducted in Jammu district of Jammu and Kashmir State to assess the existing meat handling and hygienic practices among butchers and meat retailers in Jammu District of Jammu and Kashmir. Three slaughter houses of Jammu district situated at Nagrota, Old Rehari and Gujjar Nagar were selected for the study. Ten butchers from each slaughter house were selected randomly. Thirty retail meat shops were selected and from each randomly selected retail meat shop, one meat retailer was selected. Thus, a total of thirty butchers and thirty meat retailers were selected for the study. Data was collected through a well structured interview schedule. The data was coded, classified, tabulated and analyzed using the software; Statistical Package for the Social Science (SPSS 16.0). The presentation of data was done to give pertinent, valid and reliable answer to the specific objectives. Frequencies, percentage, mean and standard deviation were worked out for meaningful interpretation.

3. RESULTS AND DISCUSSION

3.1 Meat Handling Practices at Slaughter Houses

3.1.1 Transport of slaughter animals

In the present study it was observed that the animals were brought to slaughter houses commonly by three wheeler and trucks. The transport of animal to be slaughtered was not carried out properly. The vehicles used for transport were not well designed and maintained for safe and efficient loading, unloading and transportation which posed great risk of injury and stress. Ventilation was inadequate in many transport vehicles and cleaning and sanitation were minimum. Animal were fatigued and soiled with faecal material, which had impact on safety and suitability of meat. Consideration was not given to avoid undue stress that might adversely affect the safety of meat as stress induced shedding of pathogens as evident from Plate 1. Similar findings were observed by [5] who reported that stress and physical injuries that occurs during transportation of animals for has important side effects on meat quality.

3.1.2 Presentation of animals for slaughter

The guidelines that only healthy, clean and appropriately identified animals should be presented for slaughter was hardly followed. In slaughter houses no competent person undertaking ante-mortem inspection was noticed. The animals presented for slaughter were not sufficiently clean, thus hygienic slaughter and dressing were comprised. Similar finding were observed by Rayees et al. [3].

3.1.3 Slaughtering of animals

Slaughtering means putting the food animals to death and there after preparing the carcasses for human consumption. Slaughtering of animals at slaughter houses was carried out by both halal and jhatka method. The slaughtering operation was carried out by experienced butchers on the animals grounded on slaughter hall floor, by severing all blood vessels of neck and passages (esophagus and trachea) in Halal method. The bleeding was allowed to be as complete as possible by providing usual time about 2 minutes for goat and sheep in halal method where as there was not complete bleeding in case of jhatka method. The blood collection was not done after slaughtering and most of blood was wasted causing pollution. Blood of the animals which can be collected for affective utilization was thus lost. There was no standard method of bringing the animal to the floor for slaughter. The animals were slaughtered without restraining them properly and were slaughtered in front of other animals causing great fear in them. Butchers used to bring even more than ten animals at a time and slaughter them one after other as evident from Plate 2, even butchers and other workers moved freely over carcasses without caring for hygienic measures as visible from Plate 4. Similar finding were observed by Tuneer and Madhavi [6] and Rayees et al. [3]. They reported that workers working in slaughter houses did not apply hygienic practices while cutting and processing of meat because of lack of knowledge and training regarding scientific operations in slaughter houses.

Plate 1. Transport of animals in stressed condition for Slaughtering

Plate 2. Slaughtering on unclean floor (More animals at a time)

Plate 3. Carcass inflation (Malpractice)

Plate 4. Butchers and workers move freely without following hygienic measures

3.1.4 Legging, inflation and skinning

In removing the skin of sheep and goat initial cutting of skin was done on floor itself, around hind leg to expose and loosen the tendon of hock for use as a means of hanging carcass, known as legging as evident from Plate 5 and plate 6, and on the same site pumping of air is done, carcass get inflated and removing of skin became easy without any cuts on carcass and

skin, known as inflation. By inflation removing of skin became easy without any cuts on carcass and skin, but it may sometime also lead to the contamination of whole carcass if inflated nearby area is already infected and it is scientifically declared malpractices which should be avoided shown in Plate 3. The tendon between the hock and the carcass was then placed in hanging position with tendons support. A second step called skinning involved the removal of the entire skin as visible from Plate 6.

3.1.5 Evisceration

Evisceration is the process of removing viscera from the carcass and this particular process during slaughtering generates maximum amount of waste. To avoid contamination of carcass through accidentals cuts or punctures of stomach and intestines, simple care should be taken. During the course of study it was observed that butchers do not care for preventing the intestine from puncturing during evisceration which leads to contamination of carcass as visible from Plate 7, more over they threw the visceral content near by the carcass which was totally unacceptable from the hygienic point of view as evident from plate9. The edible offal's pluck (heart, lungs, trachea and esophagus) were pulled out as a unit and these were not hung on a hook instead it was place on floor, similarly paunch (stomach and intestines) were also dropped on floor as visible in Plate10.

Scientifically the stomach and intestines should not be open while carcasses dressing is in operation as such a move can easily causes contamination of meat, but it was observed butchers were frequently doing it. After evisceration the competent/ veterinarian examine the carcass for evidence of disease and abnormality and eliminate them from the public meat supply. Meat was delivered to market soon after dressing. These findings were in agreements with the finding of [7] and Gulmez et al. [8] who observed that during evisceration of carcass the chance of contamination of carcass are more and, incorporation of decontamination steps during slaughtering-dressing procedures and storage facilities can effect improvement of microbial quality, safety and shelf life of carcass as most of the slaughter houses are lacking these hygienic measures and facilities.

3.2 Meat Handling Practices of Meat Retailers

Majority of meat retailers apart from selling meat of slaughterhouses were also selling meat produced at their own shops. In 66.7% of retailer's meat shop only meat was sold where as in 33.30% of retail meat shop both meat and meat products were sold. A significant proportion of retailers (40%) slaughtered chicken, whereas only 10% slaughtered sheep and goats at their own shop. This act of slaughtering and dressing of animals at marketing areas was creating

Plate 5. Unhygienic skinning done at floor

Plate 6. Skinning after hanging the carcass

Plate 7. Evisceration

Plate 8. Staking of carcasses one over other increase the chance of contamination

Plate 9. Offal's lying on unclean floor

Plate 10. Processing of intestine near the dressing increase the chance of contamination

nuisance in terms of spreading blood, visceral content, waste and inedible organs at nearby areas of the shop. Moreover, this practice was also wrong from public health point of view because no examination of animals before slaughtering and after dressing of carcasses by competent authority could lead to spread of many meat borne zoonotic diseases. A perusal

of Table 1 presents the practices carried out at various retail meat shops. The findings were also in agreement with the findings of Rahman and Kabir [9] who reported that meat obtained from illegal slaughtering and without proper enforcement of laws, regulations and standards cannot be regarded as free from potential threat of health risk factors.

3.2.1 Personal hygiene at retail meat shop

Personal hygiene was poorly maintained by meat handlers owing to their illiteracy, unawareness, lack of facilities and nature of work. Proper hand washing facilities were unavailable at slaughterhouses and retail meat shops. Similar findings were also observed by Rayees et al. [3] Personal hygiene of those who come directly or indirectly in contact with meat is prerequisite and an important component of meat hygiene. Meat retailers are required to maintain a high degree of personal cleanliness. They should wear suitable protective clothing and head covering. Cuts and wounds should be covered by suitable waterproof dressing. As evident from the Table 2 that only

Table 1. Distribution of respondents according to various meat handling and sale related practices

Practice	Meat retail shops (N=30)	
	Frequency	Percent
Selling		
Meat only	20	66.70
Meat products	0	0.00
Both	10	33.30
Type of meat sold		
Chicken only	03	10.00
Mutton and chevon	09	30.00
Mutton, chevon and chicken	18	60.00
Type of meat product sold		
Keema	12	40.00
Kebab	0	0.00
Rhista	0	0.00
Keema + Rhista	15	50.00
Keema + Kebab	03	10.00
Meat patties	0	0.00
Meat balls	0	0.00
Slaughtering at retail shop		
Chicken only	12	40.00
Goat and sheep	03	10.00
Chicken, goat and sheep	05	16.70
No slaughtering	10	33.30

Table 2. Distribution of respondents according to the status of personal hygiene at retail meat shops

Attributes	Meat retail shops (N=30)	
	Frequency	Percent
Clean cloth	11	36.70
Head covering	13	43.30
Washing of hands before work	12	40.00
Washing of hands after visiting toilet	30	100.00
Washing of hands after smoking	13	43.30
Washing of hands after blowing nose	21	70.00
Washing of hands after meat handling	10	33.30
Washing of hands touching bins/other contaminated objects	22	73.30
Wearing rings	09	30.00
Retailers working in meat shop exhibits		
Good personal habits	12	40.00
Unhygienic habits like spitting, nose-blowing and Coughing	18	60.00

36.70% of respondents wore clean cloth and head covering was observed in 43.30% of respondents. It was further reported that retailers washed their hands before work (40%), after visiting toilets (100%), after meat handling (33.33%) and after touching other contaminated objects (73.30%). Thirty percent of meat retailers were wearing rings. Overall, only 40% of retailers possess good personal habits while majority shows unhygienic habits. The findings were in agreement with the result of Junaidu et al. [10] and Sneed et al. [11] who reported that that personal hygiene plays an integral part in ensuring safe products to the consumer if meat handlers take serious note on the cleanliness of their hands, body and clothing.

4. CONCLUSION

Transport of animal to be slaughtered was not carried out properly. There was no standard method of bringing the animal to the floor for slaughter and considerations were not given to avoid undue stress that might adversely affect the safety and suitability of meat. The animals were slaughtered without restraining them properly and are slaughtered in front of other animals causing great fear in them. Butchers used to bring even more than ten animals at a time and slaughter them one after other, even butchers and other workers moved freely over carcasses without caring for hygienic measures. Animals were slaughtered (by both Halal and Jhatka method) and dressed in unhygienic way. Butchers do not care for preventing the intestine from puncturing during evisceration which leads to contamination of carcass. The edible offal's pluck (heart, lungs, trachea and esophagus) were pulled out as a unit and these were not hung on a hook instead it was place on floor, similarly paunch (stomach and intestines) were also dropped on floor. Meat retailers apart from selling meat from animals slaughtered at slaughter houses significant proportion of respondents were also slaughtering animals (mostly sheep and goat) at their own retail meat shops. Chicken were exclusively slaughtered at retail meat shops in front of the consumers. Personal hygiene was poorly maintained by meat handlers owing to their illiteracy, unawareness, lack of facilities and nature of work.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

SUGGESTIONS

- Short duration, government funded training need to be organized for butchers and meat retailers nearby their workshop to impart knowledge regarding meat hygiene and associated health hazards.
- Meat handlers should be provided appropriate meat quality information and adequate knowledge of meat hygiene to prevent mishandling of meat at consumers level.
- Authorities should closely monitor and regulate proper slaughtering and transportation facilities.
- Veterinarians or meat inspectors should inspect carcasses and, thereby ensuring safety to the consumers.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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