ISSN: 0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 11, pp. 14256-14260, November, 2016

International Journal of Recent Scientific Research

Research Article

A SURVEY ON THE AWARENESS ABOUT HARMFUL EFFECTS OF PROCESSED MEAT PRODUCTS AND HIGH TEMPERATURE COOKING METHODS OF MEAT ON HEALTH AMONG EDUCATED COMMUNITY OF TIRUPATI CITY, ANDHRA PRADESH, INDIA

Annie Supriya R[1]*., Swetha C.S[1]., Jagadeesh Babu A[2] and Madhava Rao T[3]

[1]College of Veterinary Science, Tirupati
[2,3]Department of Veterinary Public Health and Epidemiology,
College of Veterinary Science, Tirupati

ARTICLE INFO

Article History:

Received 16th August, 2016
Received in revised form 25th September, 2016
Accepted 23rd October, 2016
Published online 28th November, 2016

Key Words:

Awareness, processed meat, cooking methods, human health.

ABSTRACT

Diets containing substantial amounts of processed meat and meat cooked by high temperature cooking methods like grilling, smoking and deep fat frying may increase the risk of life style diseases like cardiovascular diseases, obesity, hypertension and cancer. Several studies have shown that meat cooked at high temperatures contain compounds like heterocyclic amines and polycyclic aromatic hydrocarbons known to be mutagenic and carcinogenic in humans.

A survey was conducted among educated community (n=100) of different age groups in Tirupati city of Andhra Pradesh. The study revealed that frequency of consumption of meat products from outside is weekly once (30%) , preference for deep fried meat is (41%) , grilled meat (27%) and (23%) meat cooked on charcoal fire. In the study group (51%) have the knowledge about processed and high temperature cooking methods of meat has harmful effect on human health. Only 59% of them are aware of these causing cancer.

INTRODUCTION

Lifestyle diseases are becoming an increasing concern in developing nations. These diseases are major public health problem worldwide. The (WHO, 2005) estimated 61% of all deaths and 49% of global burden of disease were attributable to chronic diseases, by 2030, the proportion of total global deaths due to chronic diseases was expected to increase by 70% and global burden of disease to 56%.The transition from plant based diet to high protein diet like red meat is thought to be the major contributor for rise in the diseases. Consumption patterns of meat and different cooking methods are said to be risk factors for the diseases. WHO projects that over next ten years the continent will experience the largest increase in death rates from cancer, diabetes and cardiovascular diseases (WHO, 2005). The most important risk factor for chronic diseases are unhealthy diet, physical inactivity and tobacco use are related lifestyle choices (Barry *et al*, 2001). Animal products are the main source of soluble fats that produce cardiovascular disease (Walker *et al*, 2005). Increase in worldwide obesity and diabetes may in part be associated with increased animal product consumption, in addition to decreased exercise and other factors (Popkin and Du, 2003).

Indians like to have homemade meals traditionally. Due to influence of western culture there is a slight shift in food consumption patterns among urban families, started with eating outside and accepting wide varieties of delicacies world over. The food corporate is successful in replacing fresh and healthy food from consumer diet with fast food and processed food. Numerous epidemiological studies have investigated meat intake and cancer risk (Alaejos MS, 2008; Huxley RR, 2009). Red meat is high in saturated fat and cholesterol. Fat contents of different cuts of meat varies markedly. Several hypothesis suggest observed relationship between red meat and cancer risk. The high iron content of red meat promote generation of free radicals, which leads to oxidation of DNA has been linked to cancer. Processed meats and high temperature cooking methods of meat such a deep frying, grilling , smoking, meat cooked on charcoal have been associated with increased risk of colorectal, pancreatic, breast, prostate and renal cancer. According to World Cancer Research Fund (WCRF) and Ameriacan Institute of Cancer Research (AICR) report in 2007 (AICR, 2007).

International Agency for Research on Cancer (IARC) which is a part of WHO classified processed meat as group 1 carcinogen, along with Tobacco and Asbestos for which there is sufficient evidence of cancer risk. Each 50g (1.8 ounce)

*Corresponding author: **Annie Supriya R***
College of Veterinary Science, Tirupati

portion of processed meat eaten there is increased risk of colorectal cancer by 18%. Cooked meat classified as 2A probable human carcinogen may rise the risk of cancer. Different cooking methods at high temperatures produces number of toxic end products like Heterocyclic amines (HCA) and polycyclic Aromatic Hydrocarbons (PAH).

Heterocyclic Amines begin to form at 100^0C. The most toxic form starts forming at 300^0C that is why grilled and charred meat are among the most hazardous and the worst part is blackened sections. HCA s are formed when amino acids, sugars and creatine reacts at high temperatures. HCAs are oxidized to hydroxyamino derivatives by cytochrome P450's and further converted into ester forms by acetyl transferase and sulfotransferase. Eventually they produce DNA adducts which is the piece of DNA covalently bonded to a cancer causing chemical. Polycyclic hydrocarbons (PAH) formed when fat and juices from meat grilled directly over an open fire drip onto the fire causing flames. These flames contain PAHs that adhere to surface of meat which bears a Nitro functional group. Reduction of nitrogroup to N-Hydroxy Amino group which is capable of binding to DNA leading to DNA adduct formation is the reason for carcinogenesis. PAH can also be formed during other food preparation processes like smoking of meats (Cross AJ, 2004). HCA's and PAH's which are formed during high temperature cooking of meat, dose-dependently generate DNA adducts (Turteltaub KW, 1999) which is a piece of DNA covalently bonded to a cancer causing chemical. This process could be the start of carcinogenesis.

Processed meat refers to the meat that has been transformed through salting, curing, fermentation, smoking and other processes to enhance flavor or improve preservation. The evidence linking red and processed meats to colorectal cancer was convincing (Larsson SC, 2006), smoked or grilled (charred) meat was also associated with higher risk of stomach cancer (WCRF, 2007).

Meat can also be a source of several known mutagens ,including n-Nitroso compounds in processed meats and Heterocyclic amines and polycyclic amino hydrocarbons formed during high temperature cooking and grilling (Cross AJ, 2004). Well done, grilled ,barbequed chicken and steak all have high concentration of HCA'S, cooking methods that expose meat to smoke or charring contribute to PAH formation (Jagerstad M, 2005) Deep frying is a high temperature cooking method ($240\text{-}270^0$C) may also result in the production of HCA'S and PAH'S (Balegh.Z, 2000). Heterocyclic amines begin to form above 300^oC. They are formed when amino acids, sugars and creatine reacts at high temperatures. Cooking methods that expose meat to smoke or charring contribute to polycyclic aromatic hydrocarbons formation (Jagerstad M, 2005).

Processing of meat often includes addition of nitrates or nitrites and higher amounts of salts. Processed meats are prepared using sodium nitrite. An epidemiological report that processed meats caused cancer in children (Peter's *et.al*, 1994) led to additional concern about potential risk of n-nitrosocompounds and levels of nitrites in meat products. This sodium nitrite reacts with amines in meat forming n-nitroso compounds (Mirvish SS, 2002) causing carcinogenesis. Heme iron present in the processed meat breaks down to carcinogenic n-nitroso compound (Cross AJ, 2003) in the digestive tract and forms cytotoxic and genotoxic aldehydes. Further consumption of cooked, canned and cured meats causes high levels of Advanced Glycation End products to accumulate in the blood stream and increase the risk of cancer, heart disease and inflammation.

Several large studies comparing vegetarians to non vegetarians have found an increased risk of Cardio Vascular Disease in persons who consume meat. Greater consumption of heme iron which is readily derived from red meat was associated with a higher risk of fatal and non fatal chronic heart disease events (Asherio *et al*, 1994). One mechanism by which red meat could increase chronic heart disease risk is increased level of harmful cholesterol. Increased total cholesterol has long been associated with risk of chronic heart disease. The reason red meat has potential to increase risk of cardio vascular disease is because it contains high proportion of saturated fat. Saturated fat can be converted to both good High Density Lipoprotein (HDL) and bad cholesterol Low Density Lipoprotein (LDL) in body. LDL is associated with high risk of Cardiovascular Disease.

The adaption of western diet with high intake of Red and processed meat, refined grain products, snacks, sweets, French fries and pizzas is believed to contribute to the epidemic of Type-2 diabetes and obesity (Song *et al*, 2009). A diet rich in red meat has been suspected as important contributor for risk of type-2 diabetes. Processed meats contain certain types of preservatives, additives or other chemicals arising from meat preparation, including preservation, packaging and cooking. These compounds include nitrates and nitrites added in meat processing as well as variety of HCA and PAH formed in red meat especially cooked well done (Lijinsky, 1999). These compounds can be converted to N-nitrosamines which were found to be toxic to β-cells (Le Doux *et al*, 1986). Consumption of foods with high content of nitrates and nitrosamines has been associated with Type-I Diabetes (Dahlquist, 1990). Advanced Glycated End products produced during cooking and processing of meat have been associated with insulin resistance and diabetes related complications in animal models (Hofmann *et al*, 2002) and human subjects (Peppa *et al*, 2002). Keeping in view of the danger that is associated with consumption of processed meats and further lack of awareness among the public about the ill effects on their health due to processed meats and high temperature cooking methods of meat, a survey conducted among the educated community in Tirupati city of Chittoor, Andhra Pradesh.

MATERIALS AND METHODS

Objective and design of the study

The major objective of this survey was basically an exploratory research to give an insight into awareness level and determinants of consumers food choices for processed meat foods and meats cooked by high temperature cooking methods on health in the targeted population.

Study area and population

The study was conducted in Tirupati, Chittoor District, Andhra Pradesh. The target population consisted of educated

community of different age groups, education levels like under graduate, graduate and post graduates belonging to different professions.

Sampling method

A simple random sampling method was used to select the respondents. Self administered anonymous questionnaire was designed specifically for the purpose of this study. The respondents were selected from the educated community of different age groups and educational qualifications from different areas of Tirupati. Data was collected using a semi-structured questionnaire. The interview was conducted on 100 respondents among them 63 were students, 23 were teachers and 13 of them belongs to different professions. All questions were in English language. The initial part of the questionnaire covered the respondents demographic information which included name, age, sex, level of education and occupation. Questions were divided into four sections. Close ended questions were given about frequency of meat products consumed from food outlets, type of meat products most preferred by the people and awareness about processed meat and high temperature cooking methods of meat causing life style diseases like cardiovascular diseases, obesity, Diabetes, Hypertension and high temperature cooking methods of meat causing cancer. The open ended questions were designed to allow respondents to describe harmful effect of processed meats on health in their own words and results were presented accordingly.

Data management and analysis

All filled questionnaires were checked for their completeness before the interviewer left that area. Upon processing of all the data, results were presented accordingly.

RESULTS

A total number of 100 people of different age groups, different education levels, and different professions from educated community were selected for the study out of which 54 % were males and 46% were females.

Table 1 Demographic characteristics of the respondents

Demographics		Percentage (%)
Sex	Male	54.00
	Female	46.00
Age	18-24	72.00
	25-34	21.00
	35-49	19.00
Education level	Undergraduates	67.00
	Graduates	14.00
	Post graduates	19.00
Occupation	Students	63.00
	Teachers	23.00
	Other professions	14.00

Table 2 Practice of red meat consumption

Question	Choice	Percentage (%)
Meat preparation	Deep fried	41.00
	Grilled meat	27.00
	Meat prepared on charcoal fire	23.00
	Meat pickles	0.00
Frequency of processed meat consumption	Very often	26.00
	Weekly once	30.00
	Monthly once	23.00
	Never	21.00

Among the total respondents highest percentage (63%) of respondents were students followed by teachers (23%) and respondents from different professions (14%).

Table 3 Awareness on processed meat and high temperature cooking methods of meat as a contributor to life style diseases.

Lifestyle diseases	Percentage awareness (%)
Awareness levels	
Yes	59.00
No	43.00
Demographics	
Age	
18-24	42.00
25-34	65.00
35-49	70.00
Education level	
Post graduates	83.00
Graduates	75.00
Undergraduates	67.00

DISCUSSION

The consumption pattern in India is gradually getting diversified to high value commodities (Birthal, 2008). The livestock products like meat and meat products are of paramount importance in this menu (Delgado *et al*, 1999). A total number of 100 respondents were selected during the study. The respondents of different age groups, education levels and professions from educated community were participated in this study. The demographic characteristics of respondents as summarized in (Table 1) showed that 54% are males and 46% are females. 72% of respondents are between 18-24 years. A higher proportion of respondents (67%) are undergraduates and 23% of the respondents have tertiary and school education. 63% 0f the respondents are students where as 37% of respondents belong to different professions.

In the present study regarding the practice of consumption of processed meat from food outlets, information is collected through lykert scale viz very often, weekly once, once in a month and never (Table 2). Respondents have shown varied levels of responses on the pattern of processed meat consumption. In the present survey 30% of them fall in the weekly once category, similar to the present investigation (Lilian, 2015) reported similar findings where 35% of the respondents consume once in a week in Kojiodo North County. As per the present study, it came to know that 21% of the respondents never consumed processed meat products, which is far lower than the finding of (Raju *et al*, 2005), who reported that processed meat items are not preferred by 65% of the consumers in Andhra Pradesh. In this study 26% of the respondents consume processed meat very often from outside, these findings are nearer to the reports of (Suresh A, 2006), that is 20% 0f the people in India consume processed meat very often from outside. 23% of the respondents in this study consume processed meat once in a month. A study done in Korea by (Chao *et al*, 2003) reported similar results that is most of the Koreans prefers to consume processed meats from outside once in a month.

Researchers found that high consumption of well done, fried or barbecued meats was associated with colorectal (Cross AJ, 2010), pancreatic (Anderson K E; Stolzenberg –Solomon RZ, 2007) prostate (Sinha.R, 2009; Cross AJ, 2005) cancer. When

red meat is cooked especially at high temperatures for a prolonged period of time under moist conditions leads to production of compounds in meat such as Heterocyclic Amines. HCA'S are mutagenic compounds that cause changes in DNA and increase the risk of cancer. The way meat is prepared affects production of HCA'S. Meat cooked at high temperature, charring and processing techniques such as smoking , curing or addition of chemicals such as n-Nitroso compounds leads to the formation of Heterocyclic Amines and Polycyclic Aromatic Hydrocarbons (PAH). In this present study 41% of respondents have shown highest preference for deep fried meat products, where as in the findings reported by (Lilian Nyomenda Bosire, 2015) in Kojiodo North County in contrast to the present study where 70% of the respondents preferred to eat deep fried meat. (Lang *et al*, 1994) suggested that those who eats fried meats have greater risk of cancer than those who eat meat cooked on other ways.

Grilling meat over a direct flame results in fat dripping on the hot fire and the production of Polycyclic Aromatic Hydrocarbons (PAH). These PAH'S adhere to the surface the food. More intense the heat, more PAH'S are formed. PAH'S are widely believed to play a significant role human cancers (Norat and Riboli, 2001). In this study, 27% of the respondents preferred to eat grilled meat, which is much higher than the findings of (Lilian Nyomenda Bosire, 2015) who reported that only 5% of the respondents in their study preferred to eat grilled meat. 23% of the respondents in this study preferred meat prepared on charcoal fire and respondents never preferred to consume meat pickles.

Awareness levels of lifestyle diseases

Poor awareness was found among the respondents in the present study. Among the 100 respondents, 51% of the respondents have the knowledge about harmful effects of processed meat and high temperature cooking methods of meat on health, causing lifestyle diseases like cardiovascular diseases, obesity, diabetes, hypertension and cancer. These findings are in contrast to the reports of (American Meat Institute, 2015) where 92% of the Americans are aware that eating processed meat affects health causing heart diseases, high cholesterol and high blood pressure. Knowledge of Americans in this regard is found to be adequate.

In the present study when asked directly about the link between eating red/processed meat high temperature cooking methods of meat and cancer, 59% of respondents reported that they have heard of this fact and similar results are reported by (Lilian Nyomenda Bosire, 2015) and they reported that 57% of the respondents are aware of this fact in Kojiodo North County. As per the reports of (American Meat Institute, 2015) only 44% of the Americans are aware of this fact. (WCRF, 2014) reported in their findings that 62% of the people in UK did not know the link between consumption of processed meat and cancer. In the present study people are already aware that eating red/processed meat can lead to ailments such as high cholesterol and heart diseases. Despite awareness of these health effects, the overwhelming majority of people still eat red/processed meat.

In this present study association between demographic characters like age and education and awareness towards harmful effects of eating red/processed meat high temperature cooking methods of meat as summarized in (Table 3) showed that respondent falling between 35-49 years of age are more concerned about healthy eating habits regarding meat and education levels also influenced the awareness levels. Respondents having education up to post graduate level has shown maximum awareness level that is 83% and low awareness levels are reported from respondents up to undergraduate level. These harmful effects can be minimized by making certain alteration in the way of cooking meat like, avoiding direct exposure to high temperature, continuously turning meat over a high heat source, removing charred portion of meat can help to reduce HCA and PAH formation. The impact of HCA can be reduced by using antioxidants such as vitamin C, E and B-carotene. (The National Academy of Science, 1982) provided suggestions for reducing the nitrate and nitrite level in cured meats. Use of reductants such as sodium ascorbate to decrease the level of residual nitrate and reduce the potential for n-Nitroso compound formation (Milkowski, 2006).

This study recommends increased health promotion in relation to processed meat consumption like continuous awareness campaigns on the dangers of over consumption of processed meat and high temperature cooking of meat in relation to its contribution to life threatening diseases must be made aware by the consumers to protect themselves from the life style diseases.

References

1. A, Suresh. Consumer's attitude towards meat consumption in India: insights from a survey in two metropolitan cities. Indian Agriculture Research Institute.
2. Alaejos, M.S., Gonzalez, V., Afonso, A.M. 2008. Exposure to heterocyclic aromatic amines from the consumption of cooked red meat and its effect on human cancer risk: a review. Food Addit Contam Part A Chem Anal Control Expo Risk Assess.
3. American Meat Institute. 2015. Progress Report: American Meat Institute, Arlington, Virginia.
4. Anderson, K.E., Sinha, R., Kuldorrf, M. 2002 Meat intake and cooking techniques: associations with pancreatic cancer. Mutation –Research. 506-507, 225-231.
5. Ascherio, A., Willett, W., Rimm, E., Giovannucci, E., & Stampfer, M. 1994 Dietary iron intake and risk of coronary disease among men. Circulation, 89, 969-974.
6. Barry Popkin. 2001."Trends in Diet, Nutritional Status, and Diet-related Non communicable Diseases in China and India, The Economic Costs of the NutritionTransition, Nutrition Reviews. 59, 379-90
7. Birthal, P.S. 2008. linking small holder livestock producers to markets: Issues and approaches. Indian Journal of Agricultural Economics, 63; 19-37.
8. Chao, A., Thun, M.J., and Conell, C.j.. 2003.Meat consumption and colorectal cancer. JAMA.293:172-182.
9. Cross, A.J., Ferrucci, L.M., and Risch, A. 2010. A large prospective study of meat consumption and colorectal risk: An investigation of potential mechanisms underlying this association. Cancer Research .70 (6):.2406-2414
10. Cross, A.J., Pollock, J.R., and Bingham, S.A. 2003. Heam, not protein or inorganic iron, responsible for

endogenous intestinal N-nitrosation arising from red meat. Cancer Res.63:2358-2360.
11. Cross, A.J., Sinha, R. 2004.Meat related mutagens/carcinogens in the etiology of colorectal cancer. Environmental and Molecular Mutagenesis.44 (1):44-55.
12. Dahlquist, G.G., Blom, L.G., Persson, L.A., Sandstrom, A.I.., and Wall, S. 1990.Dietary factors and therisk of developing insulin dependent diabetes in childhood. *British Medical Journal300*,1302–1306,
13. Delgado, C., Rosaegrant. M., Steinfeld, H., Ehui, S., and Courbis, C. 1999. Livestock 2020: The New Food Revolution: International Food Policy Discussion paper EPTD 28, Washington DC.
14. Heterocyclic amines formed from natural precursors in meat. Nutrition reviews 2005; 63(5):158-165.
15. Hofmann, S.M., Dong, H.J., Li. Z., Cai, W., Altomonte, J., Thung, S.N., Zeng, F., Fisher, E.A., and Vlassara,H. 2002.Improved insulin sensitivity is associated with restricted intake of dietaryglycoxidation products in the db/db mouse. *Diabetes 51*, 2082–2089.
16. Huxley, R.R., Ansary-Moghaddam, A., and Clifton, P. The impact of dietary and life style risk factors on risk of colorectal cancer: A quantitative Analysis
17. Jagerstead, M., Skog, K. 2005. Genotoxicity of heat processed foods. Mutation Research 574 (1-2):156-172.
18. Lang, N.P., M.A. Butler., Massengill, M., Lawson, RC., Stotts, M., Hauer-Jensen., and F.F. Kadiubabar.1994. Rapid metabolic phenotypes for acetyl-transferase and cytochrome P4501A2 and putative exposure to food borne heterocyclic amines increase risk for colorectal cancer and polyp. Cancer Epidemiology, Biomarker prevention 3,675-682.
19. Larsson, S.C., and Wolk, A. 2006. Meat Consumption and risk of colorectal cancer: a meta analysis of prospective studies. Int J Cancer.119:2657-2664.
20. LeDoux, S.P., Woodley, S.E., and Patton, N.J.1986. Mechanisms of nitroso urea-induced b-celldamage: alterations in DNA. *Diabetes 35*, 866 – 872
21. Lijinsky, W. 1999. N-nitroso compounds in the diet. *Mutation Research 443*,129–138.
22. Lilian Nyomenda Bosire. 2015 Factors associated with attitude and practice of red meat consumption and awareness of lifestyle diseases among residents of Laiser Hill location, Kajiado North County A thesis submitted in partial fulfillment for a degree of master of science in public health at Jomo Kenyatta University Of Agriculture And Technology.
23. Milkowski.A.L.2006.The controversy about sodium nitrite. Meat Industry Research Conference: American Meat Science Association, Savoy, IL.MIRC.
24. Mirvish, S.S., Haorah, J., and Zhou, L. 2002. Total N-nitroso compounds and their precursors in hot dogs and in the gastrointestinal tract and feaces of rat and mice: etiological agents for colon cancer. *J Nutr*.132:3256S-3529S.
25. National Academy of Sciences.1982 Alternatives to the current use of Nitrite in Foods. National Academy Press: Washington
26. Norat, T., and Riboli, E. 2001. Meat consumption and colorectal cancer: a review of epidemiologic evidence. Nutrition Revealed, 59(2), 37-47.
27. Peppa, M., Goldberg, T., Cai, W., Rayfield, E., Vlassara, H. 2002. Glycotoxins: a missing link in the relationship of dietary fat and meat intake in relation to risk of type 2 diabetes in men. *Diabetes Care .25*, 1898–1899.
28. Peters, J. M., Preston-Martin, S., London, S. J., Bowman, J. D., Buckley, J. D., and Thomas, D. C. 1994. Processed meat and risk of childhood leukemia (California USA). *Cancer Causes and Control*, 5:195-202.
29. Popkin, B.M., and Du, S. 2003. Dynamics of the nutrition transition toward the animal foods sector in China and its implications: a worried perspective. *Journal of Nutrition 2;133*,3898S–3906S
30. Raju, D.T., and Suryanarayana, M. V.A.N. 2005. Meat Consumption in Prakasam district of Andhra Pradesh. An Analysis, Livestock Research for Rural Development, 17(11)
31. Sinha, R., Park, Y., and Graubard, B.I. 2009. Meat and meat related compounds and risk of prostate cancer in a large prospective cohort study the united states. American Journal of Epidemiology.170(9):1165-1177.
32. Song, Y., Park, M. J., Paik, H .Y., and Joung, H. 2009. Secular trends in dietary patterns andobesity-related risk factors in Korean adolescents aged 10–19 years. *InternationalJournal of Obesity 34 (1)*, 48–56.
33. Turteltaub, K.W., Dingley, K.H., and Curtis, K.D. 1999. Macromolecular adduct formation and metabolism of Heterocyclic Amines in humans and rhodents at low doses. Cancer Letters.143:149-155.
34. Walker, P., Rhubart-Berg, P., and Mc Kenzie, S. 2005. Public health implications of meat production and consumption. Public Health Nutr.8:348-356.
35. WCRF/AICR Expert Report. Food, Nutrition, Physical Activity and the Prevention of Cancer: A Global Perspective 2007.l
36. World Cancer Research Fund, World Cancer Day: half don't know about link between diet and cancer, World Cancer Research Fund, 2014.
37. World cancer research fund. American institute for cancer research. Food, Nutrition, Physical Activity the prevention of cancer: A global perspective AICR; Washington, DC: 2007.

****

How to cite this article:

Annie Supriya R *et al*.2016, A Survey on The Awareness About Harmful Effects of Processed Meat Products And High Temperature Cooking Methods of Meat On Health Among Educated Community of Tirupati City, Andhra Pradesh, India. *Int J Recent Sci Res.* 7(11), pp. 14256-14260.