

“A study on the effects of using aluminium foil in Domestic and Hotel kitchens”

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ABSTRACT

The metal aluminium is used in various forms by the households and the hotel industry for cooking, wrapping and storing food on daily basis. It is used in the form of vessels, foils / paper and or other containers for various purposes. However, recent studies show that the use of aluminium is hazardous to humans as they get in the human body through the consumption of food cooked in aluminium and create various health related problems. To avoid such health effects the knowledge of using the same in the proper way is necessary.

This paper mainly focuses on the effects of using aluminium foil in Domestic and Hotel kitchens. The study is based on the information and data collected through a structured questionnaire from 100 respondents from varied sectors in Pune city.

Keywords: Aluminium Foil, Hotel Industry, Usage in kitchens, Health Effects.

INTRODUCTION

“Aluminium Foil” also known as “Silver Foil”, has become one of the most essential and commonly used elements in today’s kitchen, be it domestic (in houses) or industrial (in hotels). The use of aluminum foil as a cookware material, for storage of variety of foods and for the purpose of packaging of different foods is supposed to provide comfort and convenience in cooking process. Aluminum foil, or tin foil, is a paper-thin, shiny sheet of aluminum metal. It's made by rolling out slabs of aluminum until they are of less than 0.2 mm thickness. It's used industrially for a variety of purposes, including packing, insulation and transportation. It's also widely available in stores for household and hotels for use food production process. It is used for food storage, to cover baking surfaces and to wrap foods, such as meats, to prevent them from losing moisture while cooking. It is also used to wrap and protect more delicate foods, like vegetables, when grilling them. It also can be used to line grill trays to keep things tidy and for scrubbing pans or grill grates to remove stubborn stains and residue.

The aluminum foil is cheaper and provides flexibility of usage in the day-to-day processes of the industry as well as household. However, taking into consideration the amount of its usage it becomes necessary to check upon its effect on human health, specifically the adverse ones. As per the various literatures produced by the professionals in Metal science, it is found that the chemical properties of the aluminium foil are injurious to human health. This has led to a number of questions for using the same in the food industry. It has thus become important to consider this negative effect of aluminium foil to avoid the ill effects of the same on the human body. It is important for leading a healthier life with nutritional foods without losing their natural properties.

Need of the study

Aluminium is one of the most abundant metals on earth. In its natural state, it is bound to other elements in soil, rocks and clay. It is also found in small amounts in the air, water and in your food. In fact, it is naturally occurring in most of the foods, including fruits, vegetables, meats, fish, grains and dairy products.

As per the various studies about aluminium foil, it is claimed that aluminum foil in cooking can cause aluminum to seep/leach into your foods and put your health at risk. Some foods, such as tea leaves, mushrooms, spinach and radishes, are also more likely to absorb and accumulate aluminium than other foods. Additionally, some of the aluminium you eat comes from processed food additives, such as preservatives, coloring agents, anti-caking

agents and thickeners. Also commercially produced foods containing food additives have more aluminium than home-cooked foods. This study is an effort to find out the risks associated with using aluminium foil and describes how it should not be acceptable for everyday use.

Significance of the study

This in-depth study focuses on the various Effects of using Aluminium Foil in the household kitchens and the commercial kitchens of Hotels'. However, the ill effects could be avoided if aluminium foil is used in a proper manner by taking suitable precautions considering various do's and don'ts. The aim of this study is to educate the smaller crowd of audience or readers who would consider this information and attempt to bring a change by implementing various precautions in their day-to-day life while handling food and using aluminium foil in a smart manner. The basic purpose of exploring this topic is to create awareness about the various effects and damages caused by the metal foil specifically because it is used in direct contact with food. The food which is packed and cooked with the help of the metal foil is directly affected by it and ingested by people. This could be considered as slow paced damage to mankind if not rectified in time.

Definitions

Aluminum foil, or tin foil, is a paper-thin, shiny sheet of aluminum metal. It is made by rolling large slabs of aluminum until they are less than 0.2 mm thick. Aluminum is the most abundant metal in the earth's crust and it is widely distributed.

LITERATURE REVIEW

Harnoor Channi-Tiwary (2017) the article mentions that the food we eat has traces of aluminum. These, however, get expelled from the body as part of the natural digestion process. The problem arises when the amount that gets ingested is way more than the amount that gets expelled. In simple terms, this causes toxicity that may have long term ill effects on one's health. The World Health Organization suggests that a daily aluminum intake of 40mg per kilogram of body weight is within safe limits. The FDA says "daily aluminum intake for man from all dietary sources can range from 10 to 100 mg per day." This is the amount that the body is capable of excreting and getting out of the system in various ways.

Ghada Bassioni (2016) the research had explored the use of aluminium for cooking and preparing food. Aluminium doesn't just appear in foil: it is the most popular cookware material used by people in developing countries because it is cheaper to mass produce and easier to clean. But while cooking the food in aluminium pots or pans isn't a bad thing, placing it in foil and putting it in the oven is problematic. This is especially true with acidic or spicy food that's prepared at high temperatures.

Manuela Lamberti & Felix Escher (2007) According to the study Aluminum foil is an important material in laminates and has wide application in food packaging as it has better function as compared to plastic foils. The aluminum-coated plastic laminates, which can offer an alternative to aluminum foil laminates, are somewhat less efficient. The use of aluminum foil in rigid, semi rigid, and flexible package for in-pack thermal processing allows the selection of package geometries that ensure rapid heating and minimum heat damage during processing. The chemical stability of aluminum foil in contact with food depends on the composition of the food items. The study had resulted that the use of aluminum in packaging material is considered to be safe, and inner-coating of the foil is recommended in specific cases.

Sadettin Turhan (2006) The author had investigated and observed the concentration of aluminum present in the food prior and after cooking with the metal. The outcome indicated that the aluminum contents were increased but the only difference was the lesser temperature and longer time of cooking had contributed lesser towards the raise of aluminum amount present in the food cooked in aluminum foil in comparison with the foods cooked at higher temperatures and shorter time. It was observed that the white meat holds more aluminum than the red meat after cooking.

Prasunpriya Nayak (2002) While studying the impacts and diseases originated from the aluminum the author had agreed that it is the most widely distributed metal in the environment and also extensively used in modern day to day life. The study had further revealed that the body gets the aluminum from environment, food and medication. The aluminum in the body effects adversely on neural tissues which is been observed and noticed

but is not the case with the extra neural tissues. This article had also discussed the impact on structural, biochemical, and neurobehavioral changes, musculoskeletal system, respiratory system, cardiovascular system, hepatobiliary system, endocrine system, urinary system, and reproductive system with the escalated levels of aluminum in the brain which is directly connected with the before mentioned physiological systems.

R. Ranau, J. Oehlenschlager & H. Steinhart (2001) aluminum foil is often used for wrapping heat-sensitive raw food for protection against direct heat, e.g. grilled or baked fish fillets. In this study the aluminum contents of grilled and baked fish fillets with and without ingredients wrapped in aluminum foil were baked in oven for 20 min at 200°C. The aluminum contents of grilled fillets were higher than those of baked fillets some aluminum migrated from the aluminum foil into the food. As per the suggested provisional tolerable daily intake of 1 mg Al/kg bodyweight per day of the [World Health Organization, 1989], no risk to health of the consumer would to be expected from eating meals prepared in aluminum foil.

Helena Liukkonen-Lilja & Sulo Piepponen (1992) A study was carried out of the leaching of aluminum from aluminum cooking vessels and packages. The study had revealed that a very small or undetectable level of aluminum leached from packaging materials into foodstuffs which are supposed to be safe for health.

J. L. Greger, William Goetz, and Darryl Sullivan (1985) The authors in their study had described that the food cooked in aluminum utensils like uncoated new, conditioned and old aluminum pans, in stainless steel pans or in disposable aluminum trays and foil did not added a considerable amount of aluminum to the food. The aluminum content of all the foods was measured before and after cooking. It was found to be lesser than average daily intake by consumers.

Objectives

- To find the usage of aluminum foil in the kitchens.
- To propose ways to spread the awareness about reducing the usage of aluminum foils.
- To suggest the measures that can be adopted by the government to control the use of aluminum foil.

RESEARCH METHODOLOGY

This was one of the most integral part of study, in order to carry out this research and study the insights of the objectives. The effects of aluminium foils on health, how to generate awareness and government initiatives were identified and floated in the form of a questionnaire. This feedback from various targeted respondents was collected with the help of the survey questionnaire. It was circulated amongst mixed samples of various hotel professionals, aspiring hospitality management students and other respondents. This survey was specifically carried out to evaluate and fulfil the set objectives for the study.

Type of Research: A descriptive form of research was used to study the various measures to be taken towards generating awareness about effects of aluminum foils on human health along with the initiatives which government could take to reduce the consumption. This also includes surveys and fact finding enquiries in different manner.

Methods of Data Collection

Primary data - was collected from the mixed sample of various respondents majorly belonging to the hospitality fraternity and also from some domestic users. Primary data was collected through survey in the following ways:

1. **Personal Interviews:** The answer was sought to a set of pre-conceived questions through personal interviews and the data was collected in a structured way.
2. **Questionnaires:** Considering the Reviews, and the additional inputs, one questionnaire was prepared and distributed to various respondents.
3. **By observation:** The data was collected by observing the non verbal behavior to understand dynamic behavioral process.

Secondary data – was collected from published / unpublished literature on effects of aluminum foil on human health and also the latest references available from the journals, newspapers, research publications and magazines, past records and other relevant sources available online.

Questionnaire – Design and implementation: The questionnaire design was done with the aid of experts in statistical techniques and taking into account the depth needs & objectives of the study. The questionnaire was administered to the sample population and sample size.

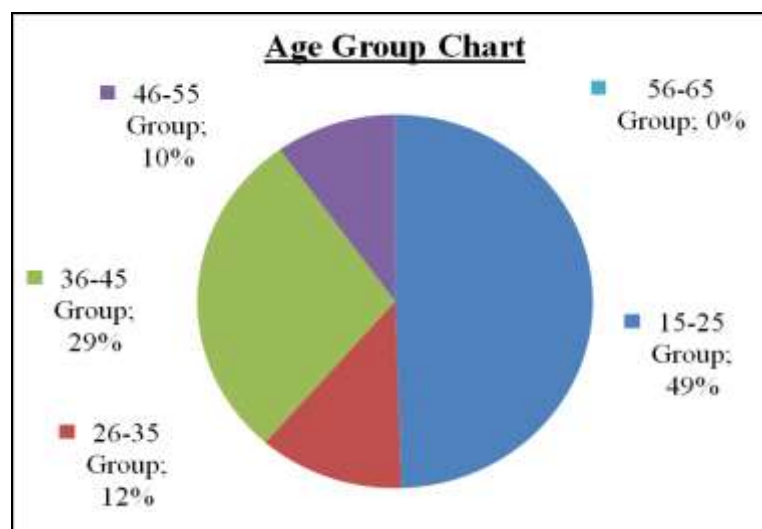
Sampling Techniques: To conduct this study different respondent was selected from various segments but majorly from hotel fraternity and also other domestic users. To achieve the minimum sample requirement a total of 150 questionnaires were distributed and in return 100 were received.

DATA ANALYSIS & INTERPRETATION

The data collected was analyzed using basic and advanced analytical tools. This also includes the detailed analysis of the data which was conducted with the purpose of attaining the set objectives of the research. Mentioned below is the analysis which is presented graphically and in tabulated form for better interpretation. The Interpretation of the collected data was done by drawing inferences from the collected facts after the analysis of the study.

Table I – Frequency Analysis – Age Group of the Respondents

Frequency					Total
15 – 25	26 – 35	36 – 45	46 – 55	56 – 65	
49 %	12 %	29 %	10 %	0 %	100%

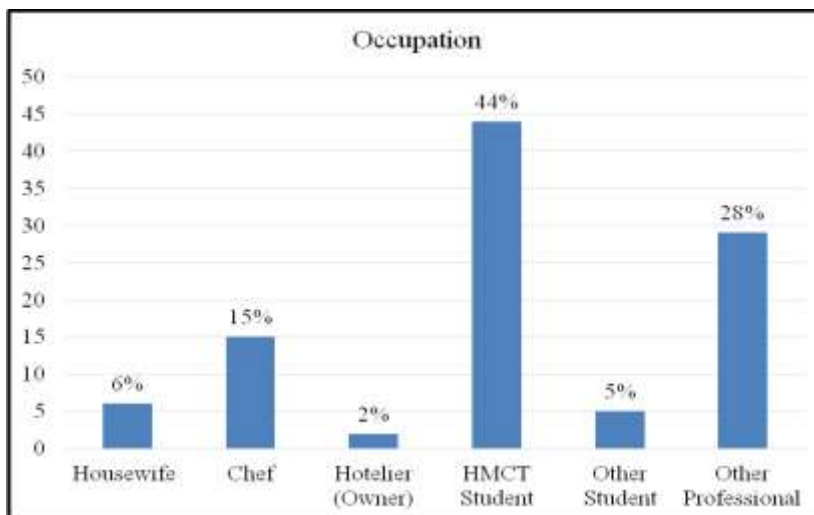


Observation: As per the chart various age groups were selected for the study ranging from 15 to 65 years. Most of the respondents i.e. 49% of the total respondents were belonging to the age group of 15 – 25 years where as 29% of the respondents were belonging to 36-45 year category.

Interpretation: Majority of the respondents were youngsters and were purposely selected to spread the awareness at an initial level of their life.

Table II – Frequency Analysis – Occupation of the respondents

Frequency						Total
Housewives	Chefs	Hoteliers	HMCT Students	Other students	Other professionals	
6%	15%	2%	44%	5%	28%	100%

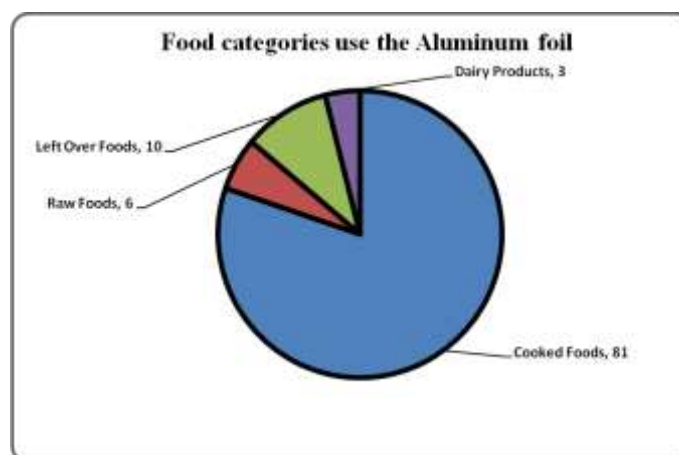


Observation: As per the chart it can be stated that the percentage of the hospitality industry professionals were more than any other category a combine percentage of 61%. The rest of the respondents i.e. 39% were belonging to a domestic category.

Interpretation: A majority of the target respondents were hoteliers as the usage of aluminum foil in the hotel industry is higher than any other segment.

Table III – Frequency Analysis – Food categories were aluminum foil is used

Frequency				Total
Cooked Foods	Raw Foods	Left Over foods	Dairy Products	
81%	6 %	10 %	3 %	100%

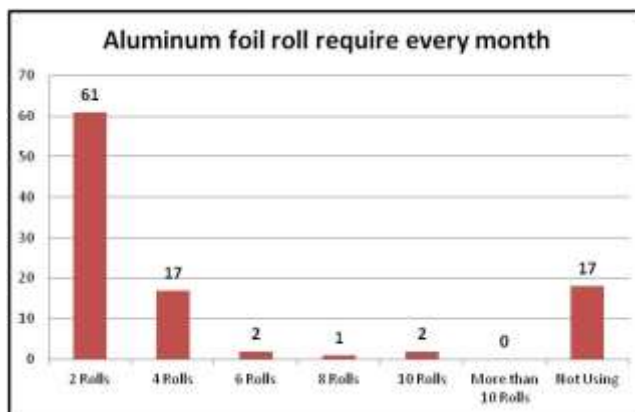


Observation: According to the above chart it can be stated that majority of the respondents i.e. 81% were of an opinion that the usage of aluminum foil was observed more in cooked food, where as the combine percentage of other factors like raw food, leftover food and dairy products were 19 % respectively.

Interpretation: A major use of aluminum foil was found to be used in cooked foods as compared to the other foods.

Table IV – Frequency Analysis – Aluminum foil roll quantity required by you every month (Considering a standard roll of 1 foot in width and 235 feet in length)

Frequency							Total
2 Rolls	4 Rolls	6 Rolls	8 Rolls	10 Rolls	More than 10 Rolls	Not using	
61%	17%	2%	1%	2%	0%	17%	100%

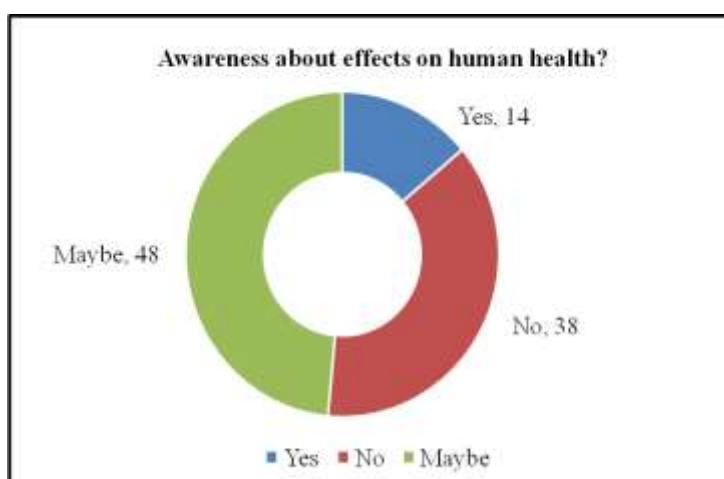


Observation: According to the above chart it can be stated that majority of the respondents i.e. 61% are using 2 rolls per month, 17% of the respondents are using 4 rolls per month, whereas a total requirement of 6, 8, 10 rolls were 5%. However 17% of the respondents were not using the aluminum foil.

Interpretation: According to the data analysis it can be stated that the requirement for usage of aluminum foil is very high amongst the respondents.

Table V – Frequency Analysis – Awareness about the effects of aluminum foil on health

Frequency			Total
Yes	No	May Be	
14%	38%	48%	100%

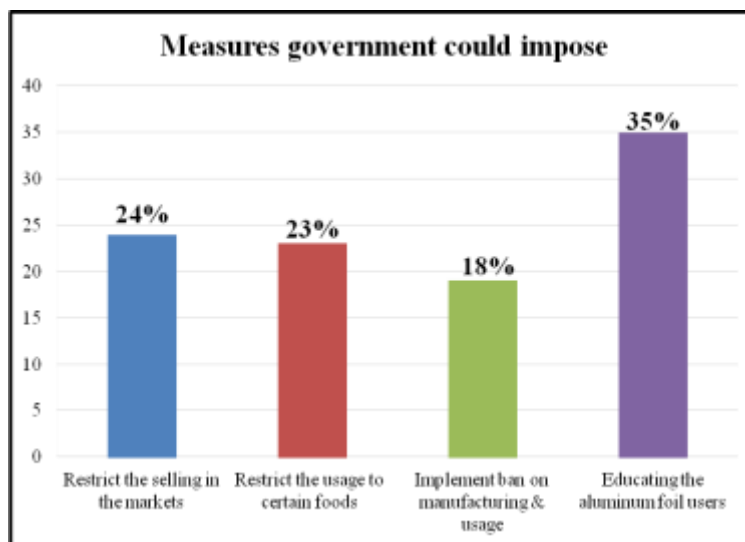


Observation: According to the above chart it can be stated that most of the respondents i.e. 48% still are unaware about the effects of aluminum foil on health; the percentage of respondents aware was 14%, whereas the percentage of respondents who were unaware about the health effects was 38% respectively.

Interpretation: The awareness regarding the health effects should be spread amongst the consumers who still are unaware about the effects of aluminum foil on the human health.

Table VI – Frequency Analysis – Government initiatives to spread awareness and reduce the usage of aluminum foils

Frequency				Total
Restricting the Sale	Restricting the usage	Implementing ban	Educating the users	
24 %	23 %	18 %	35 %	100%

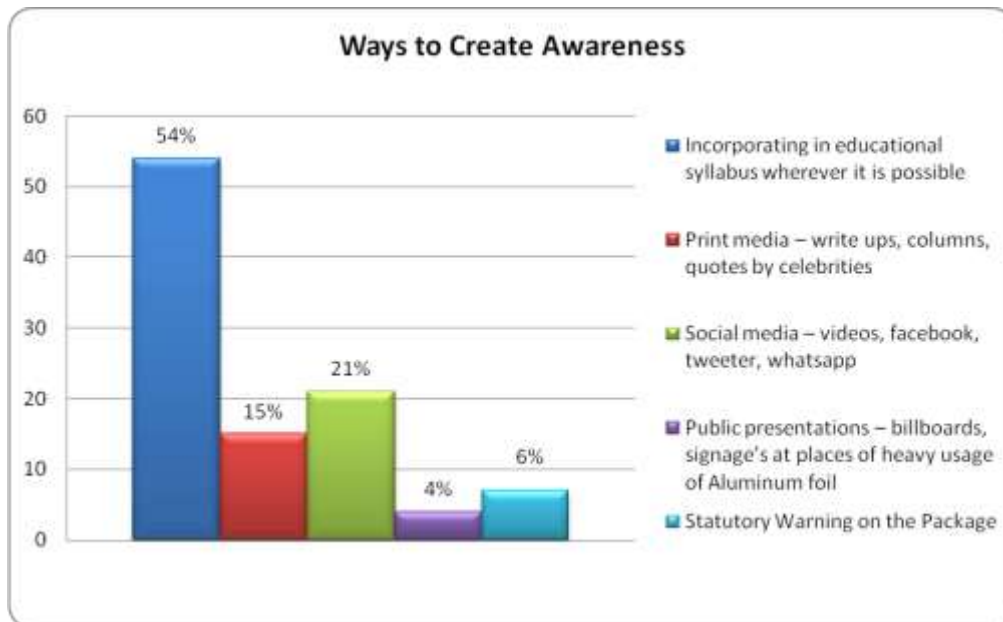


Observation: According to the above chart it can be stated that most of the respondents i.e. 35% were of an opinion that educating the users could be an option to generate awareness, 24% of the respondents says that the selling in the market should be restricted, 23% of the respondents were of an opinion that the usage could be restricted in certain foods where it is not required, whereas 18% of the respondents were of an opinion that like plastic ban there should be ban imposed on the manufacturing and selling.

Interpretation: The awareness could be generated by educating the users about the effects on health and also not to use it in foods where it is not required. The selling in the market could be reduced by increasing the price and reducing the roll size and also there could be a ban imposed by the government.

Table VII – Frequency Analysis – Ways to spread awareness about reducing the usage of aluminum foils

Frequency					Total
Incorporating in educational syllabus	Print media	Social media	Public presentations	Statutory Warning	
54 %	15 %	21 %	4 %	6 %	100%



Observation: According to the above chart it can be stated that most of the respondents i.e. 54% were of an opinion that incorporating the health effects in educational syllabus could be an option, 15% says that publishing in the print media by doing write-ups, columns, quotes etc. 21% of the respondents says that using social media platforms like Facebook , Instagram , Tweeter etc could be an option of generating awareness, 4% were of an opinion that public presentation by means of billboards, signage's where the use is heavy could be an option and lastly 6% of the respondents were of an opinion that displaying a Statutory warning on the packets could be an option of generating awareness.

Interpretation: The awareness could be generated by educating the harmful effects at an early age that is in the preschools by including in the syllabus, print media and public presentation could be an option and could be done in the areas where the usage is more. Social media could be a good option as the numbers of users are more and frequently online. Display of statutory warning on the packing like on cigarette packing could be an option of generating the awareness.

Observations and Findings

It is observed that the use of aluminium foil is equally high in both the segments of the society, i.e. household as well as the hotel industry. This use can be minimized by creating awareness amongst the users with the help of the governmental interference. This would help in reducing the use of aluminium foil.

1. It is observed that educating the users about the ill effects of the use of Aluminium foil will have a positive impact on minimizing the use on a large scale.
2. The outcome of the purposive sampling technique used amongst youngsters selected for data collection showed that generating awareness at an initial level of an individual's life is important and will help in bringing the change. Specifically because, a majority of the respondents sharing their opinion belonged to the hotel industry where the usage of aluminum foil is higher as compared to any other sector.
3. The awareness amongst youngsters could be created by including the harmful effect of uses of aluminium in their school or university syllabus.
4. The usage of aluminum foil was observed to be more in cooked foods as compared to the other foods. Other uses were for storing and packing of foods.
5. It is obvious that people are more concerned about their health and awareness pertaining to health effects should be spread amongst the consumers. People who still are unaware about the effects of aluminum foil on the human health should be educated to minimize routine use and avoid using where it is not required or necessary
6. The Government can also play an important role by imposing ban on the manufacture or by increasing the selling price which could reduce the usage to a certain extent.
7. Social media could be an effective tool for generating awareness as the social media engagement of masses is more especially the younger generation hence the awareness could be spread at a faster pace.
8. Display of statutory warning on the packing like on cigarette packing could be an option of generating the awareness.

Suggestions:

- The Government can frame strict guidelines about the manufacturing, re-cycling and use of aluminium in household as well as food industry
- The gauge and the safety precautions for aluminum foil uses could be printed on its packaging in readable font or sentences.
- Government could keep on auditing or inspecting the manufacturing units frequently to avoid any malpractices like thinner gauge and low quality raw material.
- Food and Drug Authority (FDA) could educate people through various social media platforms available now-a-days.
- Manufactures could print in bold letters about not recycling the aluminum as well as other similar material.
- Strict disciplinary action could be taken against the manufacturers and sellers who breach the regulations or standards guided by the government controlling authorities in regards of manufacturing and selling of the aluminum foil.
- If possible visuals / videos to be shown about safety practices of such food related products during the commercial breaks on television.

Conclusions:

- In the recent urban lifestyle aluminum foil is an essential commodity. Many food preparations are partly processed before cooking.
- The people are partially aware of the hazards of aluminium in food due to the use of aluminium foil or cooking vessel; however they are still ignorant and have not taken the same seriously. Hence a rigorous bombarding of this awareness is required.
- The use of aluminium is in abundance as it provides a better medium for cooking. Also, specifically it becomes convenient for single use to wrap – cook – discard or wrap – carry or wrap – store etc...
- The interference of government in creating more awareness and framing controlling measures is important to avoid the malpractices in manufacturing and proper use of aluminium is important.
- Further, the government is also required to impart the ill effects of uses of aluminium to young individuals through introduction of related topics in the school and university syllabus to generate awareness in their early age.
- The awareness about the proper ways of using aluminium is also required to be circulated on a large scale by continuous bombardment by various means.

Limitations of the study

1. This study was purely based on the information provided by the respondents i.e. Housewives, Working Professionals, Business People and professionals from the hotel industry.
2. The study was conducted in the current scenario and the opinions, perception and expectations of the respondents may differ with time.
3. The study does not differentiate respondents on basis of their demographic factors which may have an influence of their perception thereby identifying scope for further research.

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