QUALITY OF MILK AND AWARENESS AMONG CONSUMERS IN DELHI-NCR

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ABSTRACT

Food adulteration has been a big problem in this decade. Delhi is an urban city where major population is familiar with adulteration word by various means. People can be vegetarian or non vegetarian but everyone consume milk everyday in various form like curd, cheese or butter etc. We took some simple parameter like taste, shelf life of milk, preference for full cream, tone and double tone, general health, uses of testing kits to find consumer status of awareness for practical purpose and their seriousness about adulteration. Milk samples were collected from different dairies from Delhi and NCR. Fatty acid analysis and adulteration tests were performed.

Key words: Milk adulteration; formalin; Urea; Fatty acid, Ammonium salts

INTRODUCTION

This survey was done in Delhi to know the public general awareness about milk adulteration. India is one of the largest milk producer as well as consumer in the world. More than 600 million people in India are dependent on milk for nutrition. Approximately 70 Lakh litre milk is consumed in Delhi per day. Milk travels through many stations to reach the final consumer. The adulteration process starts from the fodder consumed by animal which has plenty of add-ones like pesticides used in agriculture & then milk collection , transportation, processing packaging and distribution. During all these stages milk may be adulterated knowingly or unknowingly by milk vendors, milk dairies, lack of temperature control, unhygienic transportation, atmospheric pollutants, microbes, or any other toxic metabolites. The National Survey of India on Milk Adulteration 2011 found that rural area was having

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30% adulteration in comparison to 70 % in urban cities like Delhi (Times *of India,Jan12, 2012*). The news report had also claimed that almost 69 per cent of samples tested across the country by FSSAI were found to be adulterated with detergent, fat and even urea besides water. This may cause a serious threat to health of Infants, growing children and adults as people largely depend on milk for nutrition (Faraz et al 2013). FSSAI reported presence of urea, detergents, starch& glucose in milk. "The milk available in Delhi is not contaminated with detergent but was found to be non-conforming to the Food Safety and Standards Authority of India (FSSAI) guidelines and adulteration was found in these samples," said FSSAI CEO V. N. Gaur. Countering the recent allegations of adulteration in milk, the FPA Director explained, "No case of adulterating milk by mixing detergents and urea has been detected in Delhi. The use of skimmed milk powder is permissible for reconstituting milk provided it is clearly mentioned on pouches." Posted *on 11 January 2012* letters@tehelka.com. Indian population is dependent on milk as their major source of food in infants & young children or as one of the food supplements in older ones. Early puberty, constipation& aversion to milk are some of common problems & are increasing in number.

A survey of milk consumption, effects and awareness about milk testing was done in Delhi and surrounding areas. The aim of study was to have a clear idea about general health of consumer, quantity of milk consumed per person, brand of milk preferred, preference for full cream, tone or double tone milk and preferred milk products. It was also important to assess the awareness of general public about their knowledge of changes in milk color & taste with shelf life & availability & uses of Milk Testing Kits.

MATERIAL AND METHODS

250 families were surveyed form all the districts of Delhi and NCR region. A total 100 questions bank was prepared for the consumers asking them about milk consumption per person per day, brand preferences, type of milk on fats basis, milk products and supplements used and milk quality of colour, taste, odour & eating habits (vegetarian or non-vegetarian). We also enquired about their knowledge for Milk Testing Kit & if replacement of milk was a possibility. Questions regarding general health of family were also prepared and asked. Different families from Middle class and Upper middle class were visited and asked questions.

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Poly pack and dairy milk was tested for its fatty acid contents using gas chromatography. We also tested the presence and absence of different types of adulterants in the milk .

1. The toxic substances and plasticizers were analysed by GC-MS,(modified method of Ribeiro and Ribeiro ,2010) , Microorganism by differential media from Hi media and adulterants by Lab manual 1,FSSAI ,Govt of India. GC analysis of fatty acid is done by Modified methods of Bannon et al(1987) as follows. This method takes advantage of differences in the relative elution times between different types of FAs. The method involved analyzing each milk fat using the same highly polar 100-m capillary column and GC instrument, and conducting two separations using temperature programs that plateau at 175 and 150 °C. The relative shift among the geometric and positional isomers at these two temperature settings was enough to permit identification of most of the *trans* and *cis* 16:1, 18:1 and 20:1, the *c/t*-18:2 and the *c/c/t*-18:3 isomers found in milk fat. The identity of these FAs was confirmed by prior separation of the total fatty acid methyl esters (FAMEs) of milk fat using Ag^+-SPE columns, and comparing the fractions to the total milk fat. The Ag^+-SPE technique was modified to obtain pure saturated, *trans-* and *cis*-monounsaturated and di unsaturated FAMEs. By combining the results from these two separate GC analyses, knowing the elution order, it was possible to determine most of the geometric and positional isomers of 16:1, 18:1, 20:1, 18:2 and 18:3 without a prior silver-ion separation. Only few minor FAs could not be resolved, notable the conjugated linoleic acid isomers that still required the complimentary Ag^+-HPLC separation. The two GC temperature programs have been successfully used to routinely analyze most FA isomers in total milk and beef fats in about 200 min without the use of prior silver-ion separations .Milk fatty acids (methyl esters) separated on a fused silica column coated with CP-Sil 84™. The oven was held at 30ºC for 3 min, then was raised at 8ºC per min to 160ºC and was held at this point for a further 10 min.

RESULTS

Milk use pattern and awareness

Their answers were screened thoroughly and data was correlated to prepare graphs:

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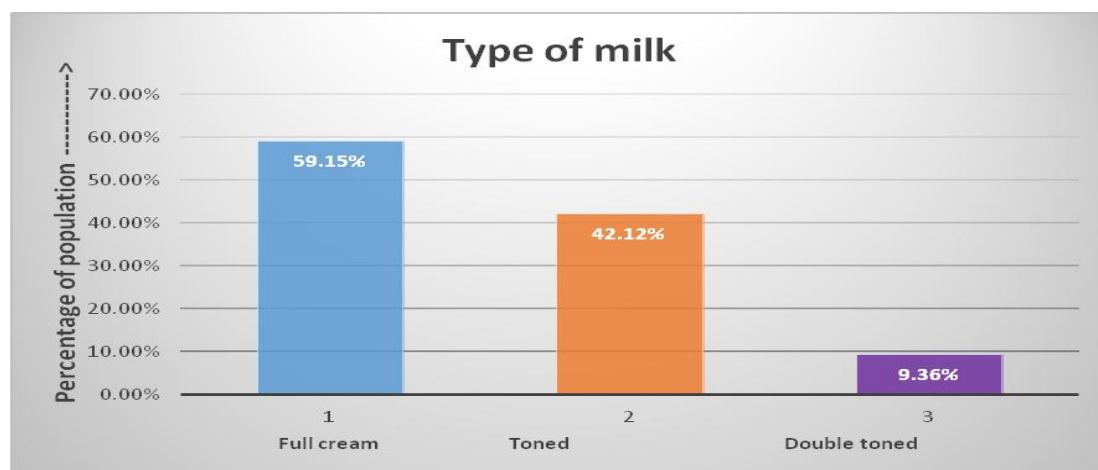
Figure 1: Percentage of population using Full Cream Toned and Double toned milk.
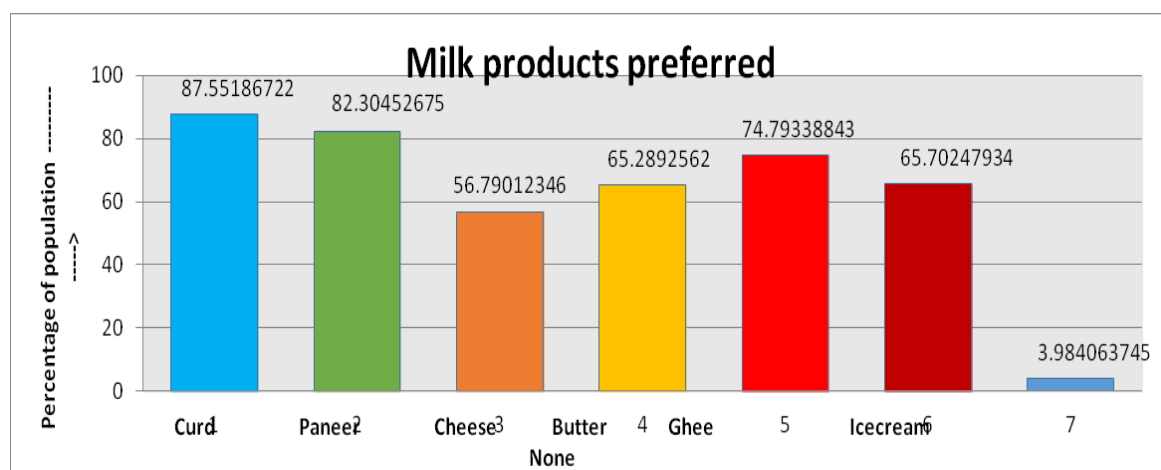
Figure 2:   Percentage of population preferring different milk products.

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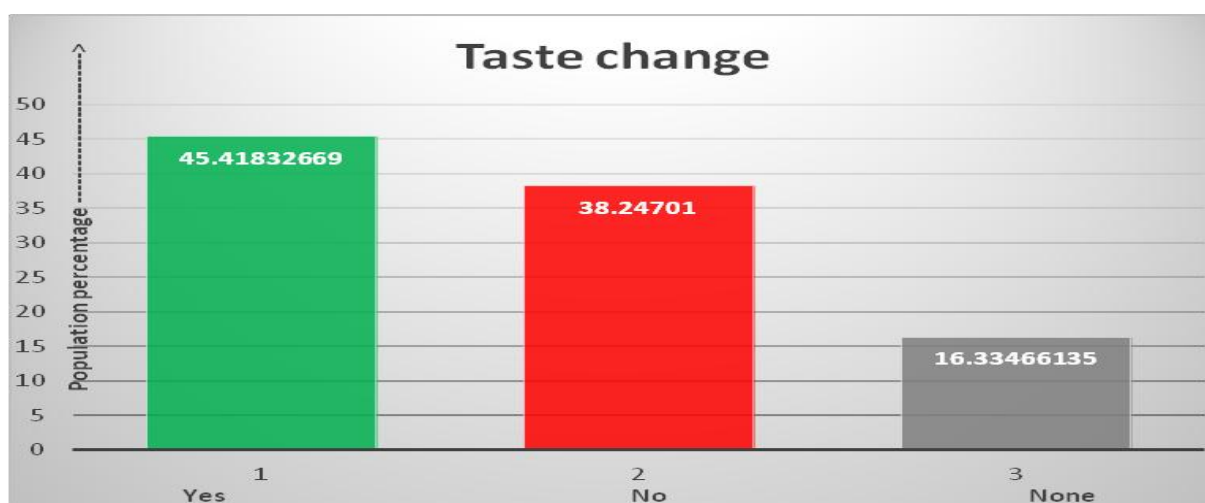
Figure 3:   Percentage of population observing taste change in milk with time.

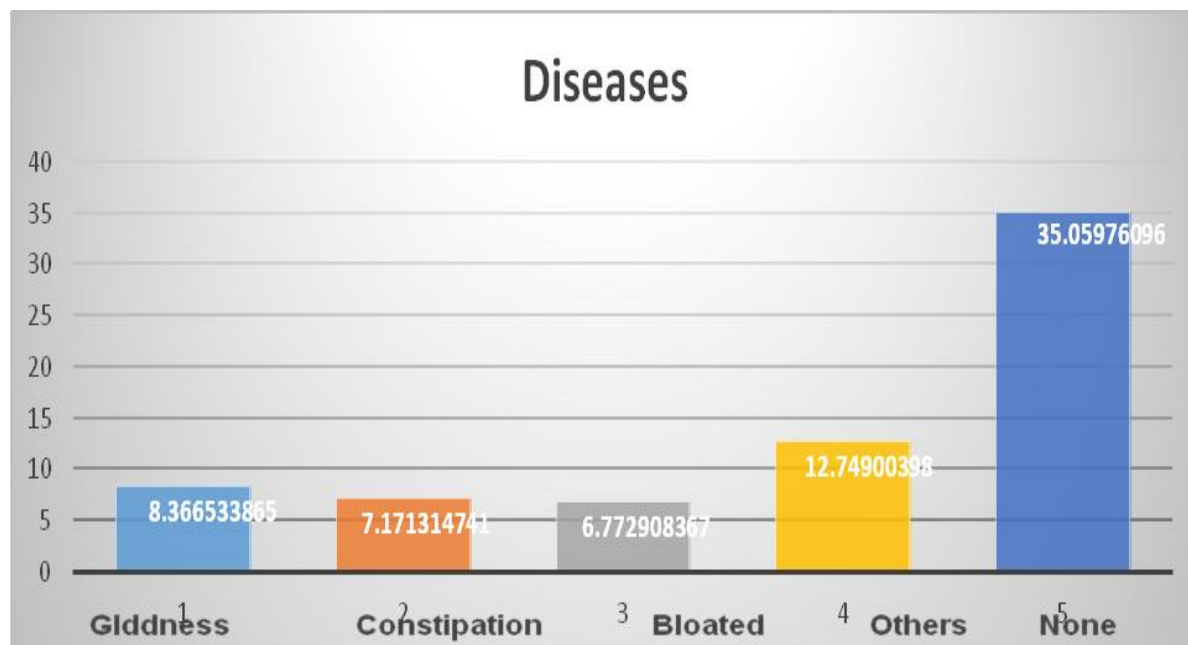
Figure 4:   Diseases observed in population after consuming milk.
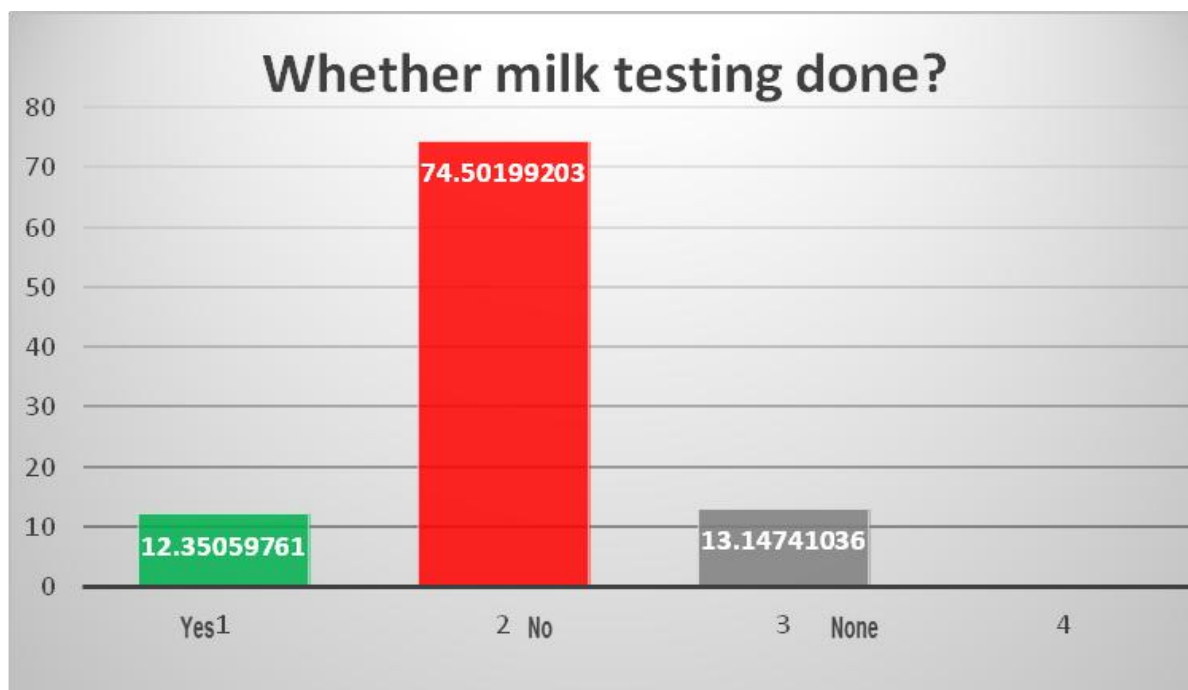
Figure 5:   Percentage of population testing milk quality.

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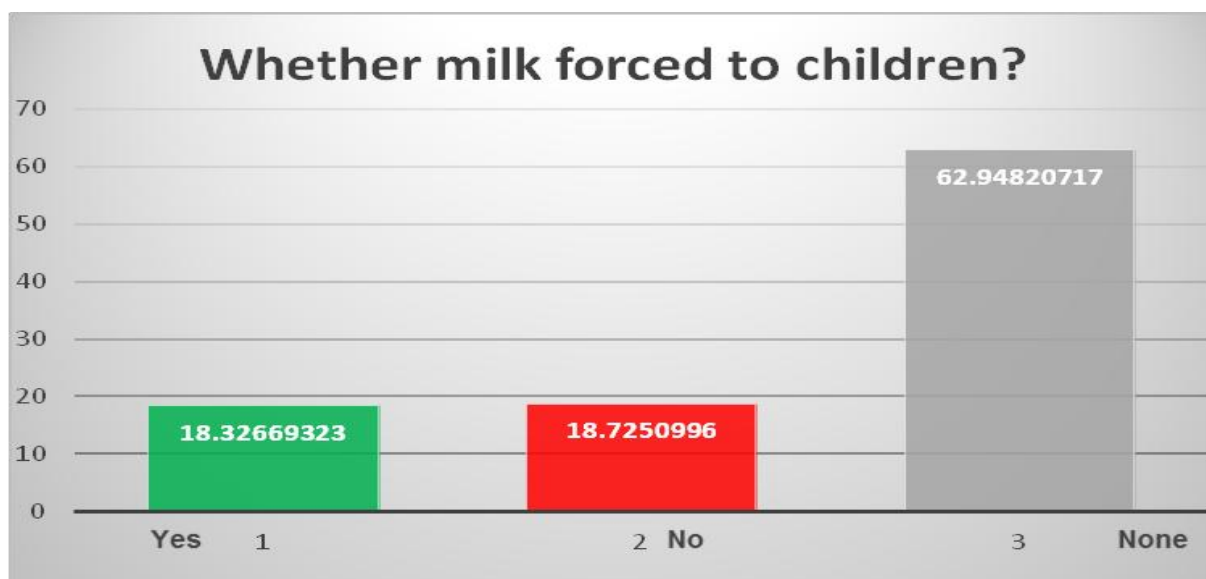
Figure 6: Percentage of population forcing milk to their children.
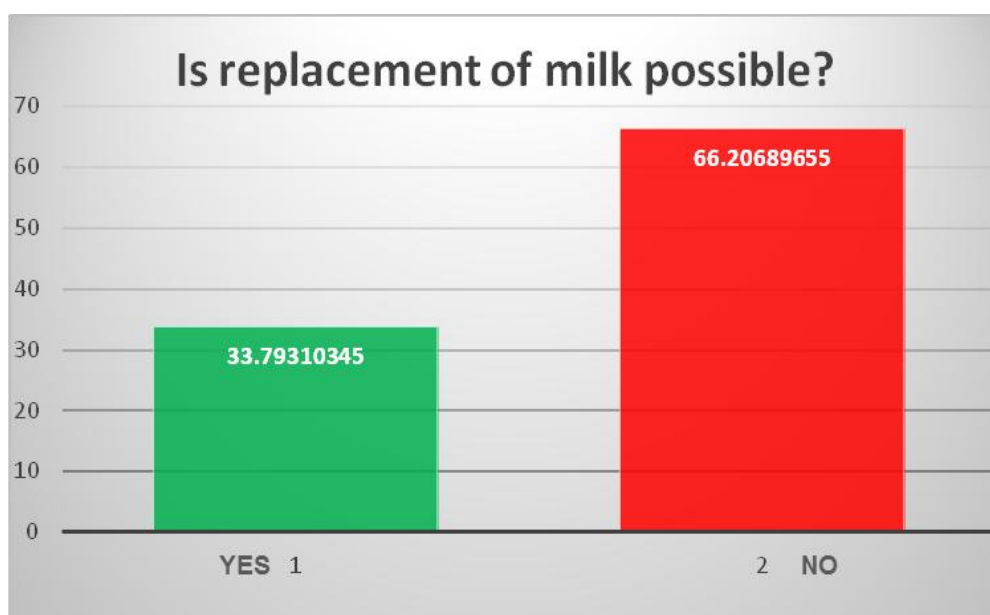
Figure 7: Percentage of population thinking that replacement of milk is possible.

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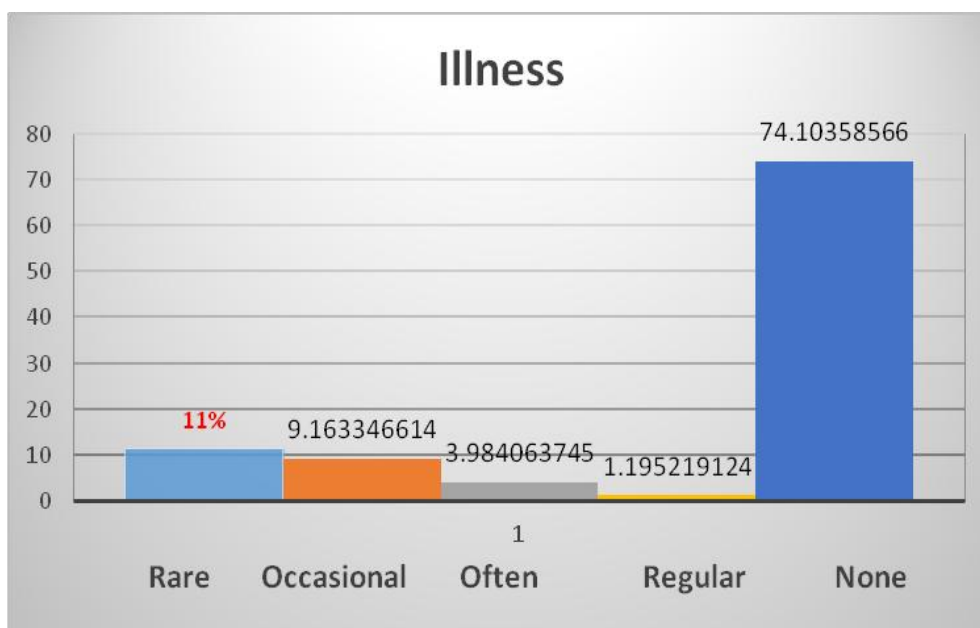
Figure 8:   Percentage of population feeling unwell after consuming milk.

Figure 9:   Giddiness effect observed in different age groups after milk consumption.

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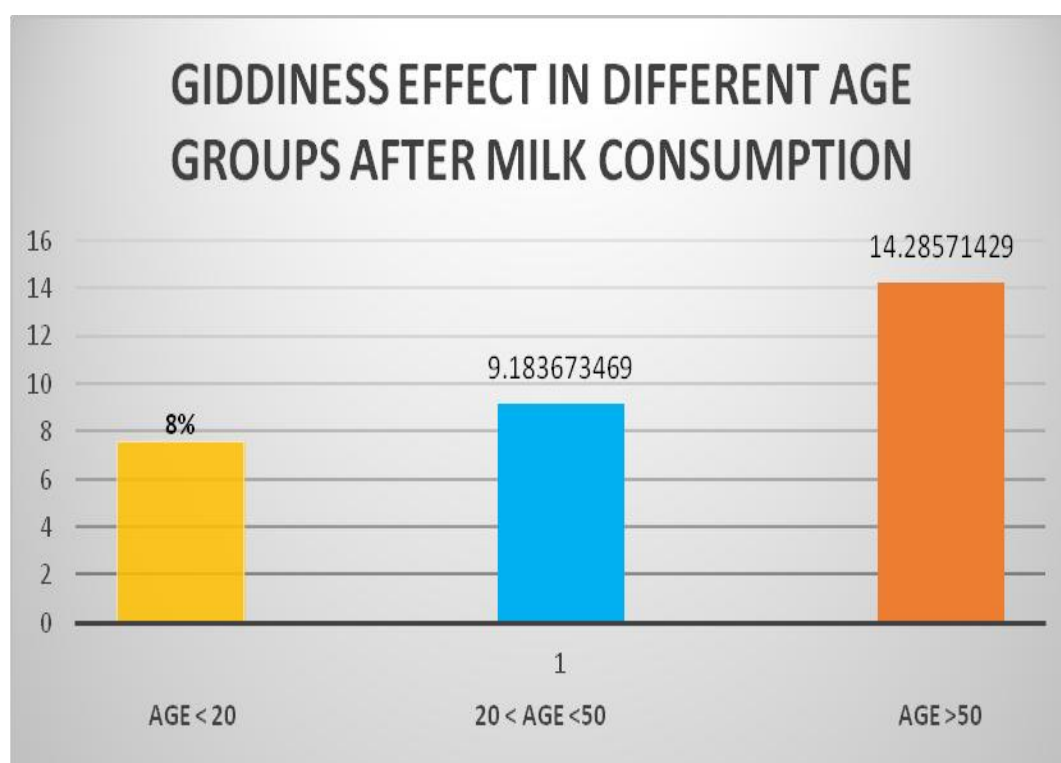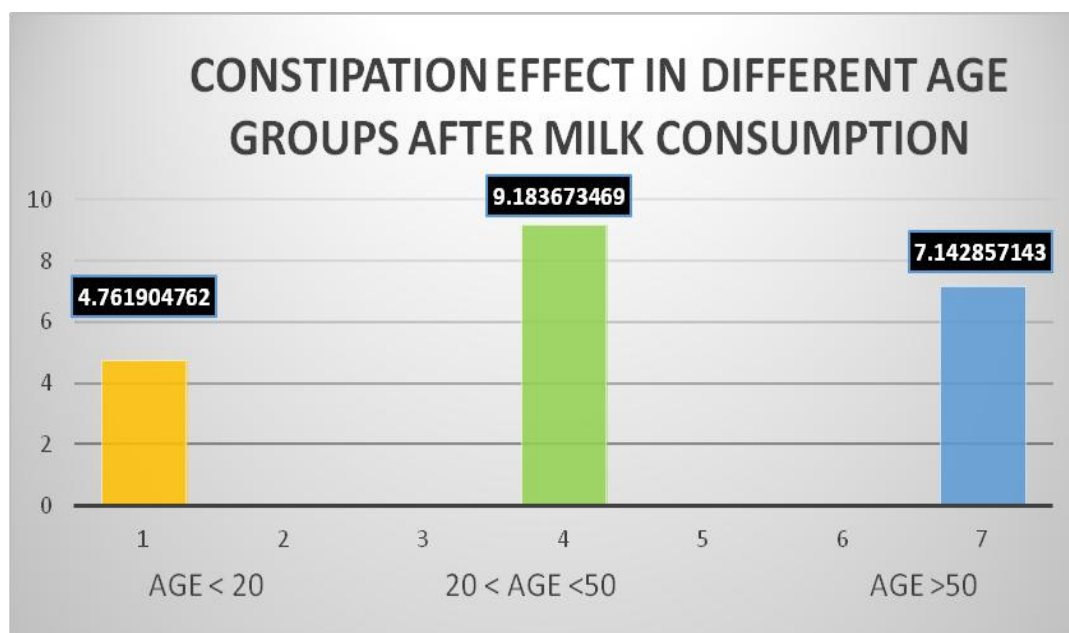
Figure 10:   Constipation effect observed in different age groups after milk consumption.
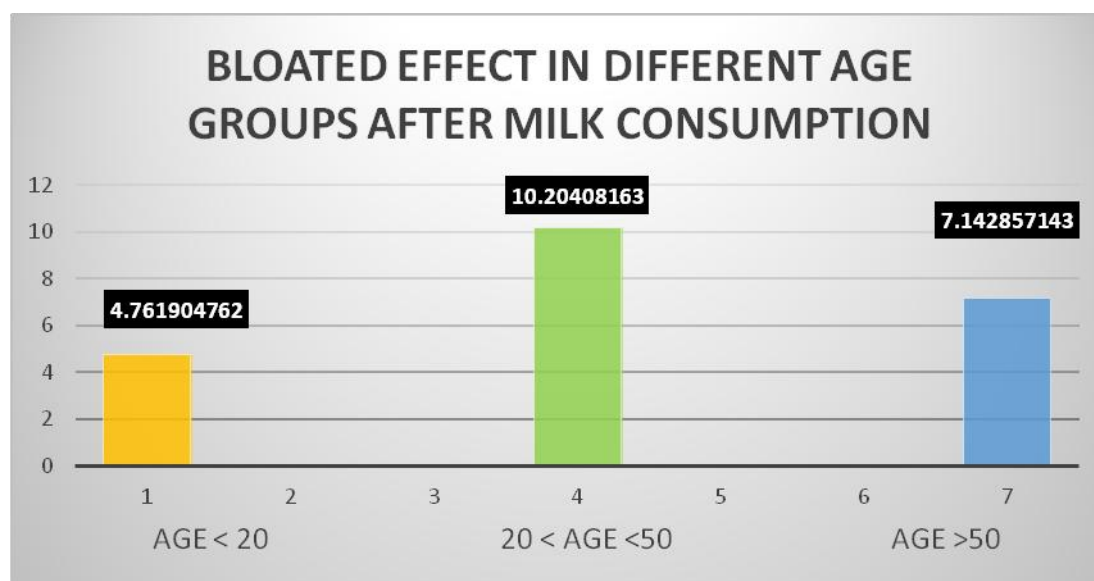
Figure 11:   Bloated effect observed in different age groups after milk consumption.

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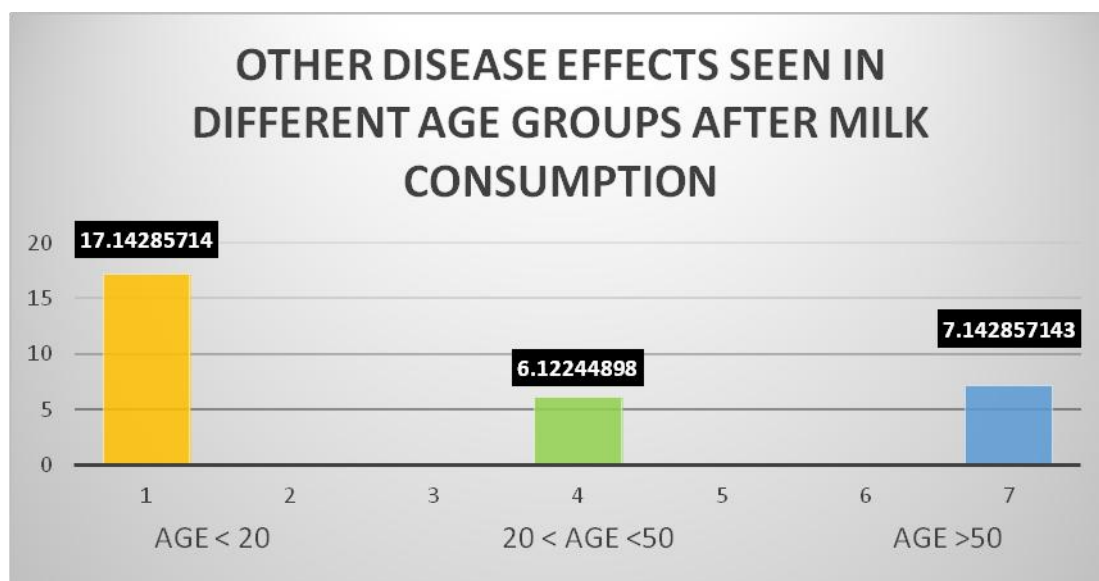Website: www.aarf.asia. Email: editoraarf@gmail.com , editor@aarf.asia   Page 21

Figure 12: Effect of other diseases observed in population after milk consumption.

Milk quality and adulteration

Fat levels were found higher (5.39 mg/100ml) in dairy milk in comparison to polypack milk (2.3 mg/100ml). Result of fatty acids present in dairy milk and poly packs are summarised in table 1 and 2. Dairy milk also tested positive of the adulterants summarised in Table 3.

Table: 1 Calculation of Different Fatty acids from Graph and data table of Sample1   Dairy milk
Total Fat =5.39g/100ml

S.No	Name of Fatty acid	%area on graph	TOTAL	Total	Total	Total
1	Heptadecanoic acid (S)	0.7885				Poly
2	Behenic acid (S)	0.1085	Saturated	Mono	Trans	
3	oleic acid (M)	24.2285				Un
4	elaidic acid (T)	5.1982		Un		
5	Behenic acid (S)	0.0155		saturated		Saturated
6	Behenic acid (S)	0.0106	Fatty	Fatty	Fatty	Fatty
7	Behenic acid (S)	0.0202				
8	pentadecenoic acid (M)	0.4443	Acids	Acids	Acids	Acids

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9	Behenic acid (S)	0.1319	0.07 %	1.33%	0.28%	Nil
10	**Behenic acid (S)**	**0.078**				
11	**Behenic acid**	**0.0589**				

Table 2: Calculation of Sample 2 from data table and Graph (Poly pack)   Total Fat -2.3g/100ml

S.No	Name of Fatty acid	% area on graph	Total	Total	Total	Total
1	(2.3g/100ml)			mono	Trans	Poly
2	caprylic acid (S)	0.666				
3	oleic acid (M)	22.2472	**Saturated**	**Saturated**		**Un saturated**
4	lauric acid (S)	4.4899				
5	behenic acid (S)	0.0428	**Fatty Acids**	**Fatty Acids**	**fatty Acids**	**Fatty Acids**
6	behenic acid(S)	0.0208				
7	Pentadecenic acid (M)	0.4389				
8	behenic acid (S)	0.1144				
9	behenic acid (S)	0.0919	**o.13%**	**0.13%**	**Nil**	**Nil**

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Table 3 Study of adulterants:

S.N	Total no of sample tested from different dairy	Test performed	presence in % in no of sample
1	50	Microbial growth	100
2	50	Toxic compounds	100
3	50	Plasticizers	100
4	50	Ammonium salts	60
5	50	H_2O_2	nil
6	50	Formalin	100
7	50	Urea	6
8	50	Cane Sugar	40

DISCUSSION

Conclusion can be drawn from the graphs based on a survey regarding milk consumption in Delhi and NCR region are as follows:

Average milk consumed by a person residing in the area surveyed in a day is observed to be 0.84 litres. When compared in qualities, full cream milk is the most consumed since, around 60% of population surveyed preferred full cream milk followed by toned milk , preferred by 43% of the population and double toned milk being the least preferred with only 9% consumption. These results obtained above are quite surprising since scientifically double toned milk is considered to be the healthiest out of the three types of milk surveyed. The fat content in double toned milk is half of the fat content in toned milk and one fourth the amount of fat in full cream milk, clearly proving that people in Delhi and NCR region consider milk as most nutritious food. Out of the six milk products surveyed for preference, curd and cheese were the clear favourites with consumption of 87% and 82% respectively,

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followed by ghee with a consumption of around 75%. Next was butter and ice-creams , consumed by around 65% of the population surveyed which makes cheese the least preferred with an average intake by 55% of the population. Concluding that Curd and cottage cheese are the most consumed milk products and other forms of cheese being the least consumed milk product. When asked if the milk changes taste after a day or so, 55% of population agreed, concluding that the taste change is observed in milk and its products when unconsumed for a day or so. When asked about the kind of illness they felt after consuming milk (if any), 35 % of population surveyed mentioned that no such illness is observed but still 8 % of population mentioned that they suffer from giddiness after they consume milk, 7 % suffering from constipation , 6% observed bloated abdomen and rest 12 % population suffered other miscellaneous problems. Concluding that though not major percentage of population feel sick when they consume milk but still a large portion of population mentioned that they feel ill and so these results can't be ignored since these percentages conclude that milk does cause illness. When asked if they ever tried to test the milk they and their families are consuming every day, a whopping 86% of population answered in negative, concluding that even when they felt sick, still didn't bother to inspect the commodity being consumed as a major part of diet. Another parameter observed was whether families force feed milk to their children & about 51% of population answered in negative.

Around 67% of the population surveyed disagreed when asked if the replacement of the milk or its products is possible concluding that milk and milk products are still a vital and major part of our diet and dietary supplements are not preferred as a replacement of milk products.

When asked on illness due to milk products 11% of population mentioned rare illness, 9% being occasionally ill when they consume milk, 3% being often ill and 1% regularly ill on consumption of milk but a majority of 75% of population felt normal. When the diseases were analysed based on the 3 age groups namely teens (< 20 years), middle aged (20 to 50 years) and old aged(above 50 years), it was observed that giddiness is majorly observed in old aged group, constipation and bloated are most common in middle aged people while other diseases were majorly found in teen.

Hence we conclude that in separate study the presence of Formalin in 100% samples while urea was nil. Presence of cane sugar was also only in 10% sample. This survey indicates consumers are aware of adulteration. They are not able to correlate adulteration to their health

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hazards directly. Formalin was found in all samples which means that formalin has replaced urea to increase shelf life. The presence of toxic substances needs to analyse different reasons for making milk inferior for health.

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