

A cross-sectional study on the association of High fat, salt and sugar (HFSS) foods on Agni among Adolescents and Young adults

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ABSTRACT

Background

High fat, salt and sugar (HFSS) food consumption and its consequences has become a major public health concern globally because of its deteriorating health consequences and urging prevalence. Though its adverse health consequences are widely prevalent in all age groups, children and adolescents are more at risk. Disturbances of Agni is the basic source aetiology for producing different kinds of bodily ailments. When Agni is in imbalanced stage, either in Mandagni stage, tiksahgni stage or Vishamagni stage, the symptoms are observed in the body.

Aim: To assess the association of High Fat, Salt, Sugar (HFSS) foods consumption on Agni among young individuals

Materials and methods

A cross sectional study was conducted among 101 participants of age group (13-17 years) and (18-25 years). Random purposive sampling technique was used. A general questionnaire was used to get the demographic data of the participants. Basic information regarding age, gender, education status, sleep status, exercise status no. of family members, medical history, diet habits was recorded as a demographic profile. Further on a non-quantitative food frequency questionnaire and two-day diet recall (1 weekend + 1 weekday) was administered to assess consumption of High fat, salt and sugar (HFSS) foods. An Agni assessment questionnaire was administered to the participants to assess the nature of their Agni. Lastly, a questionnaire was administered to observe the clinical symptoms of indigestion associated with vitiated Agni in the participants. Analysis was performed using SPSS version 25 for Windows (version 25, 2017, IBM Corporation, Armonk, New York, United States). Data presented as Mean±SD, Median (minimum-maximum) or frequency (%). Spearman correlation was used to analyse correlation of AGNI score with HFSS frequency, meal distribution and nutrient intake. P<0.05 was considered to be statistically significant.

Results

Participant's experienced clinical symptoms of indigestion (Ajirna) as the highest percentage in agreement are for belching/belching (30.7%), bloating (24.8%) and excessive thirst (23.8%). The highest percentage in strong disagreement are for Diarrhoea (52.5%), Nausea/vomiting (52.5%), heaviness of head (40.6%) and heaviness of abdomen (34.7%). The Mean frequency of incidence of symptoms when classified according to age groups showed that there was a statistical significant difference for abdominal pain and burning sensation when classified according to age groups (<0.005). The mean frequency of symptoms like abdominal pain, burning sensation (acidity) and constipation was more in age group (13-17 years) as compared to (18-25 years). On assessing the correlation of Agni and symptoms of Indigestion (Ajirna). It was observed that all the Agni's except Tikshnagni had an association with consumption of High Fat, Salt, Sugar (HFSS) foods

Key words: High fat, salt and sugar (HFSS) food, Agni, Ajirna (Indigestion), Adolescents, Young adults

Introduction

Foods high in fat, Salt & sugar (HFSS foods) are defined as foods which contain low amount of proteins, Vitamins, phytochemicals, minerals and dietary fibre but are rich in fat (saturated fatty acids), salt & sugar and high in energy (calories) that are known to have negative impact on health if consumed regularly or in high amounts. (Report of Working Group on Addressing Consumption of Foods High in Fat, Salt and Sugar (HFSS) and Promotion of Healthy Snacks in Schools of India, 2015) As per NIN “junk foods as those containing little or no proteins, vitamins or minerals but are rich in salt, sugar, fats and are high in energy (calories).” Globally as well, the term junk food is popularly used to identify as HFSS food items as they contain little or no nutritional value but high in salt, sugar and fat. Consumption of the junk food invites various health problems. The habit of the consumption of junk food is continuously increasing in young generation especially in children. (Sudeena S, 2020). In Ayurveda, Upchara Viruddha, sanskarviruddha Aahara-Junk food includes salted snack foods, sweet desserts, and fried fast food (Samata Tomar et al, 2020) Agni is the term given in Ayurveda for the whole process of energy liberation through digestion at the level of the digestive tract and metabolism at the level of tissues. (Mishra Gaurav et al 2017) According to (Kurian et al., 2017), When compared to older adults, adolescents are the primary buyers of fast-food meals. They spend the majority of their time away from home, such as at school or in classes. They eat high-fat, salt, sugar foods and gain weight, which is unhealthy. It can cause harm to health. The practice of high consumption of junk foods like Maggi noodles, burgers, sandwiches, hot dogs, patties, pastries, popcorn, potato chips, carbonated drinks, biscuits, muffins, toast, chocolates etc. have become common feature of adolescent's diet (Manjeet Kaur et al, 2019). (Samata Tomar et al, 2020) stated that in Ayurveda, Charaka has also mentioned that those people who are able to digest Viruddha Ahara properly, who exercise very regularly, who are young and have a very good status of Agni can consume Viruddha Ahara. Viruddha Aahara i.e. incompatible diet or junk food is an important aspect of today's improper dietary habits which leads to disease. According to a study conducted by (Sunita Temhunna et al, 2018) revealed many facts like the difference in diet habit and production of Agni dushti which leads to many remarkable symptoms to diseases like Praseka to Chardi, Atisārait is physiological or be pathological. Disturbances of Agni is the basic source aetiology for producing different kinds of bodily ailments. When Agni is in imbalanced stage, either in Mandagni stage, tiksāhgni stage or Vishmagni stage, the symptoms are observed in the body. A chirkārvikār of ābhyāntarogmārga marked by inhibited activity of the pachakāgni resulting in delayed or partial digestion or indigestion of food taken even in small measures at proper intervals which results in production of āma⁷ and abnormal symptoms related to the mahāsrotas which tends to affect rogamārga is termed as Agnimāndya, (Sangram Mishra, 2018). In this study we are trying to figure out how this consumption of HFSS foods in both adolescents and young adults is influencing their state of Agni which will be bridging the gap between Modern dietetic and Ayurvedic science

MATERIALS AND METHODS

Study Design and Participants This was a cross sectional observational study. Survey based research design, was used where the information was obtained from a group of individuals, representative of a large number of populations. Sample size consisted of 101 participants of age group (13-17 years) and (18-25 years). Random purposive sampling technique was used. The participant were also administered with participant information sheet and consent form. The ethical permission was sought out from K.G. Mittal Ayurvedic college, Mumbai.

Data Collection Tools A general questionnaire was used to get the demographic data of the participants. Basic information regarding age, gender, education status, sleep status, exercise status no. of family members, medical history, diet habits was recorded as a demographic profile. Further on a non-quantitative food frequency questionnaire and two-day diet recall (1 weekend + 1 weekday) was administered to assess consumption of High fat, salt and sugar (HFSS) foods. An Agni assessment questionnaire was administered to the participants to assess the nature of their Agni. Lastly, a questionnaire was administered to observe the clinical symptoms of indigestion associated with vitiated Agni in the participants.

Statistical Analysis The data was analysed using SPSS version 25 for Windows (version 25, 2017, IBM Corporation, Armonk, New York, United States). Data presented as Mean±SD, Median (minimum-maximum) or frequency (%). Normality of continuous data was assessed with the Shapiro Wilk test. Frequency of HFSS, meal distribution and nutrient intake was compared between age groups using Mann Whitney U test. Cross tabulations were computed for categorical data and compared using Fisher's exact test/ chi-square test. Spearman correlation was used to analyse correlation of AGNI score with HFSS frequency, meal distribution and nutrient intake. P<0.05 was considered to be statistically significant.

RESULTS

General Information

Table 1: Demographic data of the participants

Demographic data	Categories	Frequency	Percentage (%)
Age Group	13 – 17 years	27	26.7
	18 – 25 years	74	73.3
Gender	Males	44	43.6
	Females	54	53.5
	Others	3	3

Education status	secondary	15	14.9
	higher secondary	11	10.9
	Degree	21	20.8
	PG	31	30.7
	Diploma	3	3
	Working	20	19.8
Medical History	Surgery	4	4
	PCOS	6	5.9
	Thyroid	2	2
	None	88	87.1

The study was conducted with the aim of assessing the association of High Fat, Salt, Sugar (HFSS) foods consumption on Agni among adolescents and young individuals. In this study which included 101 participants in total, about 26.7% (n=27) were in the age group of 13-17 years and 73.3% (n=74) were in age group of 18-25 years; 43.6% (n=44) were males and 53.5% (n=54) were females.

Regarding their education status, 14.9% and 10.9% were studying in secondary and higher secondary school respectively. 20.8% were in Degree college, 30.7% were post graduates, 3% were doing diploma courses and 19.8% were working population. For their Medical history the highest % of participants which was 87.1% (n=88) had no significant medical condition.

About 5.9% (n=6) participants had PCOS, 4% (n=4) had surgery and 2% (n=2) had thyroid. No other medical conditions like diabetes, liver disorders, kidney disorder, heart conditions were observed in the participants. This signifies that the participants were a relatively healthy population with no major critical illness.

Table 2: Anthropometric data of the participants

Anthropometric data	13 – 17 years (n=27)	18 – 25 years (n=74)	Total (n=101)	P value
Height (cms)	57.89± 15.38	64.20±13.62	62.52 ±14.31	0.067
Weight (kgs)	162.19±10.35	163.29±10.39	163.0±10.34	0.948
BMI	22.02± 6.22	23.97 4.07	23.45±4.79	0.005*

*P <0.05

As per the table.2 there was statistical significant difference for BMI. (<0.005). No statistical significant difference was found out for Height and weight when classified according to age groups.(p>0.05)

Consumption of High fat, salt and sugar (HFSS) Foods

In the study, the 34 HFSS foods were divided into 4 main categories named High fat/calorie, high salt, high sugar and beverages. It was found out that the highest percentage of High fat salt sugar (HFSS) food consumption by the participants all of which was above 80% was chocolate (91%) followed by burger (86.3%), pizza (84.3%), vadapav (85.3%), Maggi/noodles/pasta (85.2%), Chips/wafers (84.1%) and Cakes/Pastries (81.3%) The highest percentage of consumption in beverages were Soft Drinks (66.4%) and Sweetened Fruit juices (66.3%). As per table 4.2, the frequency of eating daily foods like chips and wafers, khari, ice-cream, pizza, chocolates, vadapav is more among the participants. Frequency of consuming beverages and foods were less. Among the high sugar foods, Indian sweets were consumed less as compared to western high sugar products like cookies, donuts cakes and pastries. On observation it is also seen that among Beverages, sport and energy drinks are consumed on the lesser amount as compared to fruit juices, carbonated and sweetened beverages. On classifying according to the age groups that the mean frequency intake of High calorie foods (chicken nuggets, fish and chips, vadapav, samosa), high salt foods (Rolls/puffs, khari/toast/butter, Maggi/noodles/pasta, chips, wafers, papads, pickles), high sugar foods (chocolates, jams/jellies) and beverages (carbonated soft drinks and sweetened beverages) were high in (13-17 years) as compared to (18-25 years)

Table 3: Classification of participants into different types of Agni according to their age group

Type of Agni	13 – 17 years (n=27)		18 – 25 years (n=74)		Total (n=101)		P value
	Freq.	%	Freq.	%	Freq.	%	
Mandagni	1	3.7%	4	5.4%	5	5.0%	0.452
Vishamagni	6	22.2%	16	21.6%	22	21.8%	
Samagni	18	66.7%	53	71.6%	71	70.3%	
Tikshnagni	2	7.4%	1	1.4%	3	3.0%	

As shown in Table 3, There was no statistical significant difference in classification of participants into different types of Agni according to their age group (p>0.05). Despite having no statistical significance, the mean percentage of Vishamagni and Tikshnagni was more for age group (13-17 years) as compared to (18-25 years) and the percentage for Samagni and Mandagni was more for age group (18-25 years) as compared to (13-17 years).

Table 4: Mean frequency of Agni when classified according to age group

Type of Agni	13-17 years	18 – 25 years	Total (n=101)	P value
Mandagni	15.7±11.0	15.9±8.7	15.8±9.29	0.947
Vishamagni	30.7±24.3	28.3±12.9	28.91±16.60	0.975
Samagni	36.3±23.6	38.2±12.5	37.7±16.12	0.177
Tikshnagni	17.3±16.0	17.6±7.6	17.5±10.44	0.233

As per table 4, there was no statistical significant difference observed of Agni when classified according to age group ($p>0.05$). Despite not having any statistical significance, the mean frequency of Vishamagni was more for age group (13-17 years) as compared to (18-25 years) and the mean frequency for Samagni, Tikshnagni and Mandagni were more for age group (18-25 years) as compared to (13-17 years). Hence it was observed that in this particular study, that Samagni was the most prominent and Mandagni was the least prominent in both the age groups

Table5: Correlation of High Fat, salt and sugar (HFFS) foods with Agni

FoodItems	Mandagni		Vishamagni		Samagni		Tikshnagni	
	Rho Value	P Value	Rho value	Pvalue	RhoValue	P value	Rhovalue	Pvalue
Pizza	-0.123	0.222	0.141	0.159	-0.241	0.015*	0.049	0.624
Chicken nuggets	-0.068	0.502	0.121	0.228	-0.182	0.068	-0.02	0.843
Fish and chips	0.266	0.007*	0.102	0.308	-0.251	0.011*	0.006	0.952
Bacon sausage	0.052	0.605	0.035	0.731	-0.162	0.105	-0.074	0.462
Burger	-0.14	0.164	0.166	0.096	-0.192	0.054	0.048	0.636
French fries	-0.041	0.684	0.194	0.052	-0.211	0.034*	-0.053	0.597
Garlic bread	-0.012	0.901	0.183	0.067	-0.289	0.003*	-0.032	0.748
Bhajis/Pakorras	0.052	0.606	0.127	0.208	-0.215	0.031*	0.031	0.76
Vadapav	-0.002	0.983	0.148	0.14	-0.277	0.005*	0.137	0.173
Samosa	-0.121	0.227	0.173	0.084	-0.253	0.011*	0.056	0.576
Medu vada	0.008	0.939	0.260	0.009*	-0.252	0.011*	0.004	0.966
Puri/Bhature	-0.056	0.578	0.194	0.052	-0.206	0.039*	0.032	0.751
Rolls/Puffs	0.123	0.219	0.309	0.002*	-0.351	0.001*	-0.093	0.353
Khari/Toast/Butter	0.107	0.287	0.294	0.003*	-0.345	0.001*	0.037	0.711
Maggi/Noodles	0.006	0.95	0.162	0.105	-0.292	0.003*	0.022	0.824
Breakfastcereals/Co rnflakes	-0.014	0.889	0.16	0.111	-0.125	0.212*	-0.064	0.527
Chips/Wafers	-0.058	0.563	0.191	0.056	-0.311	0.002*	0.127	0.206
Papads	-0.011	0.914	0.184	0.066	-0.255	0.01*	0.153	0.127
Pickles	0.113	0.261	0.175	0.079	-0.315	0.001*	0.109	0.276
Cakes/Cupcakes	-0.084	0.406	0.145	0.147	-0.101	0.317	-0.051	0.61
Donuts	0.002	0.985	-0.005	0.961	-0.04	0.692	0.091	0.368
Chocolates	-0.031	0.76	0.113	0.262	-0.103	0.303	0.053	0.595
Cookies	-0.015	0.881	0.229	0.021*	-0.169	0.09*	-0.081	0.419

Ice-cream	-0.003	0.973	0.201	0.044*	-0.194	0.052	-0.003	0.98
Jams/Jellies	0.115	0.254	0.059	0.56	-0.11	0.273	-0.018	0.857
Rasgulla	0.03	0.763	0.185	0.065*	-0.228	0.022*	-0.082	0.413
Gulabjamun/Jalebi	-0.032	0.748	0.251	0.011	-0.260	0.009	-0.028	0.777
Kajukatli/Peda/Barfi	0.025	0.801	0.200	0.045	-0.290	0.003	-0.07	0.486
Halwa	0.12	0.232	0.047	0.641	-0.193	0.053	0.051	0.612
Carbonated soft beverages	0.07	0.485	0.220	0.027	-0.356	0.001	0.078	0.437
Sports Drinks	0.04	0.694	0.266	0.007	-0.285	0.004	-0.011	0.914
Energy drinks	-0.072	0.476	0.201	0.044	-0.12	0.232	-0.042	0.673
Sweetened beverages	-0.034	0.737	0.304	0.002	-0.271	0.006	-0.019	0.849
Fruit Juices	-0.096	0.337	0.243	0.014	-0.216	0.03	-0.058	0.563

Mandagni is statistical significant positively correlated consumption of only fish and chips and no other food items ($p < 0.05$). Vishamagni is statistical significant correlated consumption of medu vada, Rolls/Puffs, Khari/Toast/Butter, Cookies, Ice-cream, Gulabjamun/Jalebi, Kajukatli/Peda/Barfi all beverages included (Carbonated soft beverages, Sports Drinks, Energy drinks, Sweetened beverages and Fruit Juices. And negatively with donuts. ($p < 0.05$). Samagni is statistical significant correlated consumption of pizza, fish and chips, chips/wafers, papads, pickles, French fries, Garlic bread, Bhajis/Pakorras, Vadapav, Samosa, Medu vada, Puri/Bhature, Rolls/Puffs, Khari/Toast/Butter, Maggi/Noodles, Rasgulla, Gulabjamun/Jalebi, Kajukatli/Peda/Barfi and beverages included (Carbonated soft beverages, Sports Drinks, Sweetened beverages, Fruit Juices ($p < 0.05$).

No statistical significant correlations were observed between Tikshnagni and the consumption of any High Fat, salt and sugar (HFSS) food items. ($p > 0.05$). This translates that any High Fat, salt and sugar (HFSS) food items may not have association with Agni of Tikshnagni nature in this study.

Table 6: Correlation between Agni and incidence of symptoms of indigestion

Symptoms	Mandagni		Vishamagni		Samagni		Tikshnagni	
	Rho Value	P value	Rho value	P value	Rho value	P value	Rho value	P value
Abdominal pain	0.14	0.163	0.387	0.001*	-0.470	0.001*	-0.178	0.075
Bloating	-0.031	0.758	0.395	0.001*	-0.385	0.001*	-0.204	0.041*
Belching	-0.077	0.443	0.254	0.010*	-0.145	0.149	-0.222	0.026*
Burning sensation(Acidity)	0.054	0.594	0.458	0.001	-0.403	0.001	-0.304	0.002*
Constipation	0.213	0.032*	0.407	0.001*	-0.576	0.001*	-0.07	0.486
Diarrhoea	0.118	0.239	0.377	0.001*	-0.368	0.01*	-0.131	0.191
Excessive thirst	0.096	0.342	0.207	0.038*	-0.295	0.003*	0.155	0.121
Gurgling sounds	0.189	0.058	0.174	0.081	-0.273	0.006*	-0.093	0.355
Heaviness head	0.292	0.003*	0.318	0.001*	-0.395	0.001*	-0.131	0.191
Heaviness in abdomen	0.056	0.581	0.329	0.001*	-0.235	0.018*	-0.186	0.062
Indigestion	0.324	0.001*	0.423	0.001*	-0.485	0.001*	-0.156	0.119

Nausea/ vomiting	0.350	0.001*	0.276	0.005*	-0.371	0.001*	-0.142	0.156
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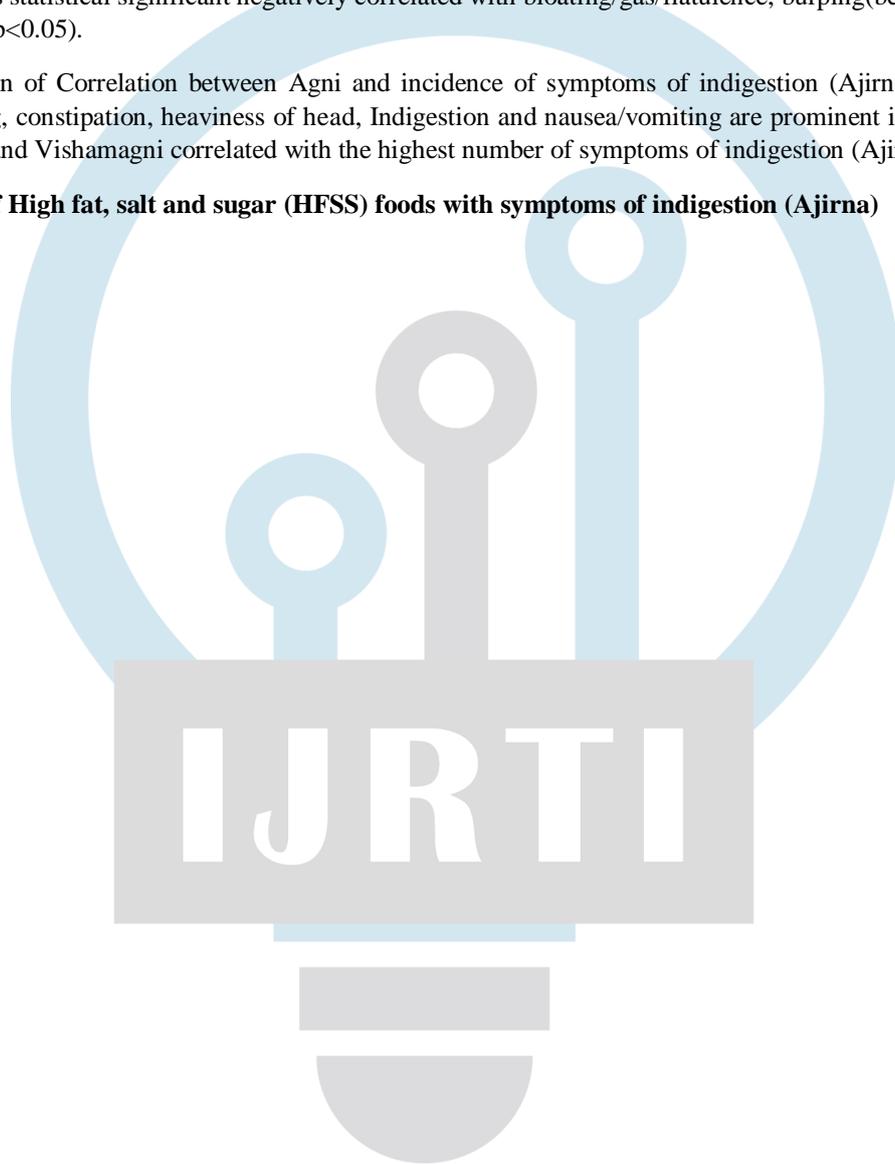
*P <0.05

Table 6. describes correlation between Agni and incidence of symptoms of indigestion (Ajirna) .Results showed that Mandagni is statistical significant correlated with constipation, heaviness of head, indigestion and nausea/ vomiting (p<0.05).Vishamagni is statistical significant positively correlated with abdominal pain, bloating/gas/flatulence/, burping (belching), Acidity (Burning sensation), Constipation, Diarrhoea, excessive thirst, heaviness of head, heaviness of abdomen, indigestion and Vomiting/Nausea constipation, heaviness of head, indigestion and nausea/ vomiting (p<0.05).Samagni is statistical significant negatively correlated with abdominal pain, bloating/gas/flatulence/, Acidity (Burning sensation), Constipation, Diarrhoea, excessive thirst, heaviness of head, heaviness of abdomen, indigestion and Vomiting/Nausea constipation, heaviness of head, indigestion and nausea/ vomiting (p<0.05).Tikshnagni is statistical significant negatively correlated with bloating/gas/flatulence, burping(belching), Acidity (Burning sensation), (p<0.05).

The final interpretation of Correlation between Agni and incidence of symptoms of indigestion (Ajirna) signifies that clinical symptom like bloating, constipation, heaviness of head, Indigestion and nausea/vomiting are prominent in at least any 3 types of Agni. Also, Samagni and Vishamagni correlated with the highest number of symptoms of indigestion (Ajirna).

Table: Correlation of High fat, salt and sugar (HFSS) foods with symptoms of indigestion (Ajirna)

*P <0.05



Food items	Abdominal pain	Bloating	Belching/burping	Burning sensation	Constipation	Diarrhoea	Excessive thirst	Gurgling sounds	Heaviness in head	Heaviness in abdomen	Indigestion	Nausea/Vomiting
	P value	P value	P value	P value	P value	P value	P value	P value	P value	P value	P value	P value
Pizza	0.082	0.28	0.377	0.196	0.007*	0.063	0.999	0.08	0.085	0.205	0.23	0.015
Chicken nuggets	0.012*	0.445	0.885	0.032*	0.045*	0.134	0.653	0.464	0.646	0.571	0.512	0.086
Fish and chips	0.022*	0.268	0.266	0.301	0.133	0.041*	0.57	0.936	0.656	0.852	0.902	0.048*
Bacon sausage	0.059	0.526	0.471	0.041*	0.023*	0.012*	0.404	0.183	0.943	0.321	0.499	0.116
Burger	0.013*	0.275	0.065	0.041*	0.037*	0.002*	0.335	0.087	0.507	0.136	0.247	0.005*
French fries	0.001*	0.072	0.153	0.003	0.004	0.029*	0.175	0.027*	0.255	0.031*	0.09	0.015*
Garlic bread	0.011*	0.133	0.243	0.002	0.004	0.036*	0.349	0.213	0.254	0.135	0.027*	0.008*
Bhajis/Pakor as	0.002*	0.088	0.051	0.01	0.001	0.041*	0.161	0.006*	0.373	0.512	0.015*	0.247
Vadapav	0.008*	0.327	0.333	0.058	0.005	0.259	0.064	0.194	0.934	0.833	0.326	0.673
Samosa	0.006*	0.24	0.297	0.014	0.006	0.252	0.27	0.138	0.344	0.336	0.192	0.277
Medu vada	0.004*	0.573	0.955	0.018*	0.001	0.001*	0.147	0.082	0.063	0.014*	0.05	0.006*
Puri/Bhature	0.003*	0.091	0.315	0.085	0.004	0.007	0.328	0.272	0.561	0.46	0.085	0.263
Rolls/Puffs	0.002*	0.125	0.214	0.007*	0.001*	0.001	0.357	0.052	0.058	0.169	0.054*	0.03*
Khari/Toast/Butter	0.001*	0.069	0.104	0.007*	0.001*	0.005*	0.085	0.001*	0.035*	0.021*	0.003*	0.05*
Maggi/Noodles	0.001*	0.038*	0.176	0.055	0.001*	0.027*	0.158	0.051	0.308	0.192	0.337	0.015*
Breakfast cereals/ Cornflakes	0.011*	0.359	0.318	0.061	0.003*	0.009*	0.284	0.018*	0.115	0.014*	0.149	0.009*
Chips/Wafers	0.001*	0.006*	0.181	0.013	0.001*	0.012*	0.123	0.095	0.214	0.46	0.132	0.089*
Papads	0.005*	0.428	0.304	0.064	0.006*	0.096	0.057	0.403	0.23	0.181	0.386	0.116
Pickles	0.011*	0.672	0.583	0.002*	0.002*	0.01*	0.165	0.092	0.075	0.4	0.124	0.025*
Cakes/ Cupcakes	0.029*	0.036*	0.613	0.097	0.034*	0.347	0.285	0.229	0.59	0.631	0.619	0.073
Donuts	0.046*	0.331	0.144	0.031*	0.022*	0.037*	0.355	0.093	0.169	0.37	0.985	0.035*
Chocolates	0.455	0.401	0.859	0.341	0.244	0.872	0.618	0.859	0.551	0.994	0.464	0.538
Cookies	0.125	0.205	0.047*	0.002*	0.001*	0.025	0.183	0.01*	0.02*	0.03*	0.352	0.091
Ice-cream	0.034*	0.427	0.656	0.326	0.13	0.086	0.064	0.236	0.185	0.629	0.848	0.446
Jams/Jellies	0.006*	0.328	0.961	0.051	0.001*	0.001*	0.415	0.152	0.189	0.447	0.523	0.039*

Rasgulla	0.001*	0.231	0.187	0.006*	0.002*	0.002*	0.023*	0.002*	0.044*	0.012*	0.049*	0.006*
Gulabjamun/ Jalebi	0.003*	0.28	0.094	0.002*	0.001*	0.002*	0.006*	0.085	0.092	0.047*	0.117	0.024*
Kajukatli/Pe da/ Barfi	0.002*	0.272	0.049*	0.003*	0.006*	0.06*	0.045*	0.121	0.101	0.105	0.12	0.015*
Halwa	0.005*	0.587	0.556	0.221	0.002*	0.004*	0.004*	0.01*	0.014*	0.07	0.172	0.001*
Carbonated soft beverages	0.001*	0.441	0.547	0.211	0.016*	0.002*	0.07	0.302	0.388	0.574	0.421	0.054
Sports Drinks	0.014*	0.389	0.772	0.022*	0.023*	0.001*	0.122	0.653	0.037	0.174	0.027*	0.001*
Energy drinks	0.064	0.885	0.523	0.43	0.345	0.01*	0.703	0.927	0.236	0.898	0.481	0.018
Sweetened beverages	0.002*	0.181	0.153	0.001*	0.001*	0.02*	0.211	0.077	0.025*	0.028*	0.131	0.048*
Fruit Juices	0.077	0.586	0.235	0.057	0.011*	0.082	0.307	0.112	0.535	0.244	0.681	0.123

As observed in table7, Abdominal pain had the maximum amount of correlation with most of the High fat, salt and sugar (HFSS) foods. Excessive thirst and burping/belching had the lowest amount of correlation. Bakery items like khari/butter/toast which are High fat and high salt correlated with almost all the symptoms. There was correlation observed between Indian sweets/confectionary items too. In beverages, there was a statistical significant correlation between carbonated soft beverages, sport drinks, energy drinks and sweetened beverages with abdominal pain, constipation and diarrhoea. The final interpretation of Correlation of High fat salt and sugar (HFSS) foods with symptoms of indigestion (Ajirna) signifies that Abdominal pain, constipation, diarrhoea and Nausea/vomiting are the symptoms of indigestion which confirmed correlation with most of the High salt sugar and fat (HFSS) foods.

DISCUSSION

In the study, it was observed the mean frequency of eating daily foods like chips and wafers, khari, ice-cream, pizza, chocolates, vadapav is more among the participants. Frequency of consuming beverages and foods were less. Among the high sugar foods, Indian sweets were consumed less as compared to western high sugar products like cookies, donuts cakes and pastries. On classifying according to the age groups that the mean frequency intake of High calorie foods (chicken nuggets, fish and chips, vadapav, samosa), high salt foods (Rolls/puffs, khari/toast/butter, Maggi/noodles/pasta, chips, wafers, papads, pickles), high sugar foods (chocolates, jams/jellies) and beverages (carbonated soft drinks and sweetened beverages) were high in (13-17 years) as compared to (18-25 years). According to (Kurian et al., 2017), When compared to older adults, adolescents are the primary buyers of fast-food meals. They eat high-fat, salt, sugar foods and gain weight, which is unhealthy. It can cause harm to health. In this study which included 101 participants in total, about 26.7% (n=27) were in the age group of 13-17 years and 73.3% (n=74) were in age group of 18-25 years; 43.6% (n=44) were males and 53.5% (n=54) were females. The practice of high consumption of junk foods like magi noodles, burgers, sandwiches, hot dogs, patties, pastries, popcorn, potato chips, carbonated drinks, biscuits, muffins, toast, chocolates etc. have become common feature of adolescent's diet (Harmanjot Kaur, 2019)

Classification of participants into different types of Agni according to their age group showed that there was no statistical significant difference ($p > 0.05$) Hence this signifies there is no prevalence of a particular type of Agni when compared between adolescents and young adults. Despite not having any statistical significance, when the mean frequency of Agni was taken and classified according to age group it was observed that Vishamagni was prevalent for age group (13-17 years) and Samagni, Tikshnagni, Mandagni were for age group (18-25 years). On final observation for this particular study, we can state that Samagni was the most prominent and Mandagni was the least prominent in both the age groups.

On assessing the correlation of Agni and High Fat, salt and sugar (HFSS) foods. It was found out that all the Agni's except Tikshnagni had an association with consumption of High Fat, Salt, Sugar (HFSS) foods.

In correlation between Agni and incidence of symptoms of indigestion (Ajirna) it was observed, all the four Agni's showed statistical significant difference with majority of the symptoms (< 0.05). And that clinical symptom like bloating, constipation, heaviness of head, Indigestion and nausea/vomiting are prominent in at least any 3 types of Agni. Also, Samagni and Vishamagni correlated with the highest number of symptoms of indigestion (Ajirna). According to Sudeena S. et al, 2018, 45% of patients were

more interested to take deep fried diet like samoshā and cake more often, in comparison to 28.33% who rarely had so. In the same study 41.67% suffered from nausea occasionally and 25% regularly 30% of patients were suffering from constipation (Vibandha) regularly and 50% of patients were suffering from the problem occasionally causing, Agnimāndya.

Ravi Verma et al, 2020 found out that all subjects were consuming different kinds of junk food with high mean frequency that was 3.28 days per week also 80.83% subjects were suffering from nutritional problem, and 73.33 % GIT problems. Another study by K. Basumatary et al, 2019 developed an agni assessment scale which included patients from OPD, almost 36 participants reported cases of bloating and abdominal pain. 38 patients reported feeling nauseated, gurgling sounds in the abdomen. Majority of participants also reported constipation diarrhoea which are symptoms of indigestion (Ajirna).

CONCLUSION

Food is vital for life and consumption of a variety of foods takes place in day-to-day life. According to Ayurveda Ahara and Vihara play an important role in a healthy and happy life. Adolescence is a pre foundation of adulthood. Whatever food we consume affects our body internally in many ways. Agni is one such internal digestive power which influences the mechanism of the whole body according to Ayurveda.

Results found out that there were correlations observed between all the Agnis except Tikshnagni and the consumption of any High Fat, salt and sugar (HFSS) food items. ($p>0.05$). This translates that any High Fat, salt and sugar (HFSS) food items may not have association with Agni of Tikshnagni nature in this study.

This study also revealed that there is an association when one consumes foods in High fat, salt and sugar which influence the Agni in such a way that it reflects symptoms of indigestion (Ajirna).

The highest percentage in agreement are for belching/belching, bloating and excessive thirst. Diarrhea, Nausea/vomiting, heaviness of head and heaviness of abdomen were the symptoms which showed highest disagreement which can be a scope for further research in the field of dietetics and Ayurveda. It was also observed that Mandagni, Vishamagni and Samagni showed the most incidence of symptoms of indigestion (Ajirna) when Tikshnagni showed none.

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