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Screening of Mycoflora Infesting on Some North Indian Fast Food

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A number of fast food items are commonly sold on road-sides of Indian cities and their sub-urbs. During present investigation, mycoflora of four fast food items viz., chat, samosa, dahibada and panipuri have been studied. In comparison to PDA, Czapec-dox medium supplemented with casein hydrolysate, yeast extract, peptone and vitamin mixture was found to be more suitable for isolation of fungi. From the period from January, 2010 to June, 2010 altogether 11, 9, 7 and 10 fungal species were isolated from chat, samosa, dahibada and panipuri, respectively. The fungal species were *Aspergillus niger, A. flavus, A. fumigatus, A. nidulans, A.* spp., *Penecillium* spp., *Nigrospora* spp., *Trichoderma* spp., *Chaetomium* spp., *Phoma* spp., *Rhizopus* spp., *Alternaria* spp. *and Mycelia sterilia*. In all the food items, the mycoflora was dominated by *Aspergilli, Penicillium* spp., *Chaetomium, Alternaria and Rhizopus* spp. On average 37.5 percent of total fungi on the four fast food was represented by different species of *Aspergillus*. *Penicillium* spp. was 13.00 percent while *Rhizopus* spp. contributed about 9.00 percent of total fungi, while contribution of *Alternaria* was approximately 11.00 percent.

Key words: Fast Food, Mycoflora, Contamination, Unhygienic, Hand-carts, Nutrients.

Food materials being rich in nutrients favour the growth of microbial flora if there is sufficient moisture within them. This is especially true for fast food items which are sold every where in most of the Indian cities. The way of their preparation and handling is very much unhygienic. These are kept in open on hand-carts and consumed by customers even after 2-3 days of their preparation.

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A number of micro-organisms including bacteria, fungi as parasites and saprophytes are associated with these food materials. Parasitic organisms present in food result in numerous food born diseases. Saprophytes are also equally harmful as they release many toxins in foods due to their metabolic activities (Embaby and Abdel Galil, 2006).

A number of fungal species have been isolated from various food materials like wheat flour, corn meal, brown rice and peanuts (Mislivec *et al*., 1979), black and red pepper (Christensen and Kaufman, 1967; Sharfun Nahar, 2004a,b; Hashmi, 1989) and various condiments of daily use like Cumin, Saunf, *Trigonella* etc. (Lal and Raizada, 1975; Hashmi and Thrane, 1990). Mislivec *et al.* (1979) have reported altogether 65 species belonging to 22 genera of various fungi from 10

types of selected health foods. Likewise, 5 fungal genera viz., *Alternaria, Aspergillus, Epicoccum, Fusarium* and *Trichoderma* were reported from some legume seeds by Embaby and Abdel-Galil (2006). From Indian red chillies, Sharfun Nahar (2004) have reported 47 fungal species. Besides *Aspergilli, Penicillia* and other very common molds, these fungal species included *Absidia, Acremonium, Blakeslea, Cladosporium, Scopulariopsis* etc. Commonly used condiments like coriander, cumin, saunf, curcuma and *Trigonella* have also been found to be highly contaminated with various fungi. In this regard, Lal and Raizada (1975) have reported fourteen fungal species from these condiments.

Fast food materials are in fact the mixtures of cereal products, beans, vegetables and various condiments which are mixed before or after cooking. Besides, these are sold on open hand-carts in unhyegenic condition and consumed after a long gap after their preparation. They are therefore, expected to contain many saprobic microbes growing in them. Therefore, the present investigation has been started to have an insight into the mycoflora infesting on fast foods and their effect on the biochemical composition of foods.

MATERIAL AND METHODS

Collection of fast food samples

Samples of the four food materials under study viz. chat, samosa, dahibada and panipuri were regularly collected at 15 days interval from the hand-cart vendors of Mungeli naka, Pratap chowk, Dewakinandan chowk and Narmada chowk areas of Bilaspur city. These were immediately carried to laboratory and refrigerated to avoid further contamination of samples.

Culture Media

As noticed in the beginning of the investigation, supplemented Czapec dox medium was better than PDA. Therefore, this culture medium was used for isolation of fungi from the food materials. It has following constitution -

Dextrose	-	10.00gm
KNO_3	-	6.00 gm
KCl	-	0.52 gm
$MgSO_4$	-	0.52 gm
$K H_2PO_4$	-	1.52 gm
$CuSO_4$, $FeSO_4$, $ZnSO_4$	-	Traces
Peptone	-	2.00 gm
Yeast Extract	-	1.50 gm
Casein hydrolysate	-	1.00 gm
Vitamin mixture	-	1.00 gm

(Containing - biotin, pyridoxin hydrochloride, nicotinamide, theamine hydrochloride, riboflavin)

Isolation of Fungi

For this purpose, suspension of 1.00 gm of well mixed samples in 10.00 ml of pre-sterlized distilled water was prepared with the help of mortar-pastle. After filtration with double layered muslin cloth, the suspension was centrifuged at 500 RPM for 10 minutes in a Remi centrifuge. 0.1 ml of the 3rd dilution of the supernatant was plated on petriplates. Plates were incubated at 30°C and observed for fungal growth after 72 hrs of incubation. The isolated fungi were identified on the basis of their morphological characters (Christenson and Kaufman, 1967)

Table 1. List of Fungi obtained from fast food

S.No.	Fungi	Chat	Samosa	Dahibada	Gupchup
1	*Aspergillus niger*	+	+	+	+
2	*A. Flavus*	+	+	+	+
3	*A. Fumigatus*	+	-	-	+
4	*A.* spp.	+	+	-	-
5	*Penicillium* spp.	+	+	+	+
6	*Rhizopus* spp.	+	+	+	+
7	*Nigrospora* spp.	+	-	-	+
8	*Trichoderma* spp.	+	+	+	+
9	*Phoma* spp.	+	+	-	+
10	*Chaetomium*	+	+	+	+
11	*Alternaria* spp.	+	+	+	+

Percentage Frequency Determination

During present investigation, the frequency of fungi obtained from specific fast food from January to June, 2010 was calculated by using the following formula -

$$\% \text{ Frequency} = \frac{\text{Number of colonies of a particular fungal species}}{\text{Total Number of Fungal colonies}} \times 100$$

RESULTS AND DISCUSSION

Altogether 11 fungal species belonging to 8 genera were isolated from chat. Likewise, Samosa, dahibada and panipuri yielded 9, 7 and 10 species of fungi (Table-1). A critical study of fungal growth obtained from chat revealed that during January to June 2010, *Aspergillus niger, A.fumigatus, Penicillium* spp., *Chaetomium* spp. and *Alternaria* spp. were dominant among fungal species infesting on the fast food. Their frequencies were 14.00, 11.07, 10.30, 11.03 and 10.80 percent, respectively. In samosa, *A. niger* (20.48%) *Penicillium* species (14.86%), *A. flavus* (12.16%), *Alternaria* spp. (12.83%) and an unknown species of *Aspergillus* (11.48%) were dominating. The condition was almost similar in dahibadas. Among the fungi isolated from this fast food, *Aspergillus niger*, *Penicillium, Chaetomium* and *Alternaria* species were dominant which showed frequency of 17.40, 15.27, 14.70 and 14.13 percent. 'Panipuri' showed relatively less number of fungi in terms of colony count. However, number of species of fungi isolated from this fast food was 10 as compared to 7 from dahibadas. Here also, *A.niger, Penicillium*, *Rhizopus* and *Phoma* species were dominant. They showed the relative frequencies of 14.28, 13.09, 14.28 and 10.71 percent.

As far as the seasonal abundance of fungi infesting on fast food is concerned, highest number of fungal colonies could be isolated in the month of June (200) which was followed by January (110) and May (109). Predominance of *Aspergilli, Penicillium, Rhizopus* and *Alternaria* observed on the fast food materials was not unexpected because all these are very common in food materials like cereals, beans, pulses and condiments etc (Mislivec *et al*., 1979). Further, these have also been reported to contribute higher in the aeromycospora of the region (Jadhav and Tiwari, 1994). The source of inoculum of fungi in the fast

Table 2. Monthly variation of the prevalence of fungi (from Jan 2009 to June 2009) on fast food

S. No.	Fungi	Month wise No. of colonies and their frequencies*																																					
		January				February				March				April				May				June				Total				Grand Total			
		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D						
1.	*Aspergillus niger*	3	3	3	1	2	3	4	2	2	2	6	2	3	2	6	1	7	10	5	3	21	10	8	3	38	30	32	12	112									
2.	*A. flavus*	1	3	2	1	2	2	3	1	3	2	4	1	6	1	6	2	5	4	4	2	10	6	6	2	27	18	25	9	79									
3.	*A. furnigatus*	3	0	0	0	3	0	0	0	7	0	0	0	5	0	0	0	6	0	0	0	9	0	0	4	33	0	0	4	37									
4.	A. spp.	2	2	0	0	2	0	0	0	0	3	0	0	4	1	0	0	4	3	0	0	6	6	0	0	16	17	0	0	33									
5.	*Penicillium* Spp.	2	3	3	2	2	3	4	1	4	2	4	1	6	2	6	1	6	5	5	2	8	7	7	4	28	22	29	11	90									
6.	*Rhizopus* Spp.	3	1	8	1	2	3	3	1	2	2	4	2	2	0	0	2	3	0	0	3	7	4	6	3	19	10	21	12	62									
7.	*Nigrospora* Spp.	2	0	0	1	1	0	0	1	2	0	0	1	4	0	0	0	3	0	0	2	6	0	0	3	18	0	0	8	26									
8.	*Trichodema* Spp.	2	2	3	1	0	0	6	2	2	0	3	3	2	0	4	0	2	3	5	0	5	6	7	2	13	11	28	8	60									
9.	*Phoma* Spp.	3	2	0	1	2	0	0	2	3	0	0	2	6	0	0	1	4	0	0	0	6	3	0	3	24	5	0	9	38									
10.	*Chactomium* Spp.	2	2	4	2	2	3	6	2	5	3	4	1	7	4	3	0	6	0	7	0	8	4	3	2	30	16	27	7	38									
11.	*Altenaria* Spp.	12	11	11	2	10	4	6	1	7	2	6	1	0	0	0	0	0	0	0	0	0	2	3	0	29	19	26	4	78									
	Total	35	29	34	12	26	20	32	13	37	16	31	14	45	10	25	7	46	25	26	12	86	48	40	26	275	148	188	84	695									

A = Chat B = Samosa C = Dahibada D = Panipuri

*Average of three plates of every sample collected twice a month

food may be the fungal mycelium or spore perenating on constituents of the fast food or the aeromycospora which contaminate the fast food containers due to the force of gravitation or wind velocity. Further investigation on the isolation of fungi and biochemical analysis of fast foods is in progress.

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