



Activity Pattern, Rest and Stress of Children

Sapna Dinesh Prasanthi¹ and Syama Kumari S.²

¹Kesava Dev Road, Mudavanmugal Poojapura, Trivandrum-695012, Kerala, INDIA

²Dept. of Home Science, Kerala Agricultural College, Trivandrum, Kerala, INDIA

Available online at: www.isca.in, www.isca.me

Received 27th April 2014, revised 7th June 2014, accepted 20th June 2014

Abstract

The nature of children's recreational pursuits has changed dramatically over the last few decades. Formerly children used to spend much of their recreational time engaged in active outdoor play, but with the emergence of television, computer games and the internet children are now spending much more of their free time engaged in sedentary pursuits. Earlier Stress and stress related problems were more common among adults than children. But studies indicate that today stress levels among children are also going up dangerously. Amongst the many factors like the pressure of academic or co curricular activities, sedentary lifestyle of today's children is also indicated as a cause for their stress. Hence this study was formulated to understand the stress level of children, their activity pattern and the relationship between the two factors.

Keywords: Stress, activity pattern, sedentary lifestyle, adolescents.

Introduction

The human body evolved to be physically active. In other words, our bodies require adequate physical activity to remain healthy and stress free. The importance of physical activity for the physical, mental and social health of youth is undisputed. Unquestionably, the challenges posed by the growing issue of physical inactivity, childhood obesity, stress and stress related problems can be considered to be some of the greatest challenges to public health in the 21st century.

Bijilakshmi and Satpathy stated that generally stress is the change that our bodies experience when we, adjust to the continuously changing environment. It has both physical and emotional effects on us and can create positive and negative feelings. As a positive influence, stress can compel us to action, and to face challenges resulting in a new awareness and an exciting new perspective. As a negative influence it can result in feelings of distrust rejection, anger and depression which in turn can lead to several health problems such as headaches, high blood pressure, and heart disease etc¹.

Stress is by no means an exclusive adult or children's problem. Stress is actually a feeling of discomfort that is experienced somewhat differently by children and adults and from one individual to another. The present study holds great significance in the modern day context. It is reported that many children all over the world today are experiencing severe stress, stress related problems and show stress related behaviors. But not many studies are done in this field to understand the level of stress in children or the relationship of their activity pattern and stress. Also, a comparative study of stress and activity pattern of children residing in our country and our children living abroad will definitely give a clear perception of this. Considering all

these, the present study is attempted to find out the level of stress in children, their activity pattern and the effect of activity, rest and sleep on the stress of children.

Objectives: i. To study and compare the stress and activity pattern of children of Kerala residing in the home country or abroad. ii. To understand the relationship of the activity pattern, rest and sleep of children with their stress.

Methodology

School children studying in Trivandrum and Malayalee students studying in Abu Dhabi were selected for the study. Being the capital cities, Trivandrum and Abu Dhabi were the places selected for the study, as a major cross section of the population could be obtained from both of these places. Being a foreign country UAE has got different living conditions and lifestyle. So Abu Dhabi was chosen in order to compare the influence of the living conditions on the stress of children from Kerala residing in Abu Dhabi. Schools offering state/central syllabi and also both government and private schools were selected particularly to get a curriculum and income wise representation. Government schools were particularly chosen so as to get a representation of different socio economic status too. The stress of children from both the places was assessed using a simple and appropriate scale developed for this purpose.

Relevant and locally suitable stress scale was not available and hence a simple stress assessment scale (S.A.Scale) was developed and standardized following standard procedures. A pilot study was done on 493 children, selected from other schools not selected for the study to test the clarity, ambiguity and difficulty of the statements and the feasibility to measure stress. After item analysis the statements were finalized and the reliability of the finalized scale was found to be 0.99.

The S. A. Scale thus developed was administered to school children from 4 to 17 years of age. Three schools were selected each from Trivandrum and Abu Dhabi using random sampling method. From each school two divisions of each class from preschool to XII STD were randomly selected and the scale was administered. The data was collected from 80 preschoolers, 202 children from I – V STD, and 385 children from VI-XII studying in Trivandrum and 152 preschoolers, 307 children of I-V STD and 488 children of VI-XII standard studying in Abu Dhabi. A total of 667 children in Trivandrum and 947 children in Abu Dhabi were screened for stress and thus the scale was administered to a total of 1614 children from 4-17 years of age. The sample was finally selected based on their stress scores and only those with above normal stress were included.

From the total children screened, both from Trivandrum and Abu Dhabi 30 children with highest stress scores were selected from each age group ranging from 4 to 17 years giving equal representation to boys and girls , i.e. a total of 840 children formed the major sample, 420 each from Trivandrum and Abu Dhabi.

For studying the activity pattern each respondent was asked to prepare an activity time log of a working day and a holiday stating the time spent on each activity from the time one gets up in the morning to the time one goes to bed. The activities were then classified into sedentary, moderate, heavy based on the type of activity. Sedentary activities included rest and leisure time activities like television watching, movies, listening to music and other light activities. Under moderate activities studying, walking moderately fast, other activities done while standing that requires moderate arm movement were included. Heavy activities included exercise, walking fast, hand washing large articles, dancing, hanging out clothes, sweeping, cleaning, mopping etc².

The data collected was consolidated and statistically analyzed to find out the level of stress in children based on region, age and sex. The activity pattern of the children with above normal and its relationship with their stress too was studied. The results obtained are given below with interpretations.

Results and Discussion

The children were grouped age wise into early childhood years (4-6 years), late childhood years (7-10 years) and adolescence (11-17 years)³. The stress of children was divided into five levels namely, normal, mild, moderate, severe and very severe. The study revealed that out of the 1614 children studied, more than 90% of the children showed mild to moderate level of stress. The children with above normal stress in both the cities are depicted in table 1.

In Trivandrum when age wise comparison was made, it was seen that children faced more stress during early adolescence. Gender wise comparison revealed that 99.1% of the girls and

99% of the boys faced above normal stress. It was different for children from Abu Dhabi. Unlike Trivandrum, late adolescence was very stressful for girls where as for boys, preschool age and beginning of adolescent period seemed to be stressful. Compared to Trivandrum, only 91.3% of the girls and 93.7% of the boys had above normal stress. But it can be noted that when both boys and girls equally faced stress in Trivandrum, boys (93.7%) faced more stress than girls in Abu Dhabi (91.3%).

Similar results were obtained in a study reported to determine the prevalence rates and severity of depression, anxiety and stress among Saudi adolescent boys indicated that out of 1723 adolescent boys studied, 59.4% had at least one of the three disorders namely depression, anxiety and stress, 40.7% had at least two and 22.6% had all the three disorders. Moreover, more than one third of the participants (38.2%) had depression, while 48.9% had anxiety and 35.5% had stress. Depression, anxiety and stress were strongly, positively, and significantly correlated⁴.

However, a study by Mizra et al revealed that girls experienced higher stress than boys due to frustration, self-imposed stress, and peer pressure⁵. Similar results were obtained in a study done in Brazil by Sbaraini and Schermann⁶. According to the study, of the total sample of 883 children studied, 27.2% of children over 10 years and 18.2% of 14-year-old children showed a significantly higher prevalence of stress. All these references point to the fact that gender and age had profound influence on the stress level of children.

With a view to study the activity pattern of the children and its relation with the stress they experienced further analysis was done. . For this their activities were classified into sedentary, moderate, heavy and sleep based on the type of activity. From this, time spent for each type of activity was calculated for a day along with the time spent for rest and sleep. The time spent for each type of activity is depicted in table 2.

The results revealed that more time was spent for moderate activities and least time was spent for heavy activities which indicated that the children spent most of the time for study/tuition or for other academic related activities and least time was spent for heavy physical activity irrespective of sex. It was also seen that besides moderate activities, more time was spent for sleep by the children irrespective of age and sex on both holidays and working days. The results also revealed that there is not much difference in the time spent for activities by girls and boys on working days and holidays.

However, when sleep pattern of the children was studied, it was seen that, adolescents slept for more hours and preschoolers the least comparatively. It was found that children slept for 7 to 8 hours in working day ad holiday irrespective of sex.

Previous research studies indicated that lack of physical activity and more time spent in front of television and computers, make

children lethargic and prone to issues like eye problems, memory and general mental health. Lots of physical activity is required for the growth and health of children and adolescents. Research throughout the world point that most of the lifestyle related diseases of the era and even the growing infertility seen among the youngsters of today are due to too much of time spent before TV and computer with no time for active physical

exercises. Even the lack of socialization with friends other than those through computer is affecting their personality, increasing their stress and negatively affecting their mental health. Surprisingly, adolescents particularly boys, too spent less time on heavy activities. They generally concentrate only on one or two things at a time for e.g. studies, coaching classes etc.-and computer.

Table-1
Distribution of children from Trivandrum and Abu Dhabi based on age, sex and level of stress

TVM	Total No of Girls Identified	Normal Stress No (%)	Total No of Girls with Above Normal Stress N(%)	Boys N=(321)	Age in Years	Total No of Boys Identified	Normal Stress No (%)	Total No of Boys with Above Normal Stress N(%)
Age in Years								
4	30		30(100%)	4	27			27(100%)
5	16		16(100%)	5	17			17(100%)
6	17	1(5.9)	16(94.1%)	6	17			17(100%)
7	21		21(100%)	7	15			15(100%)
8	24		24(100%)	8	23			23(100%)
9	32		32(100%)	9	19	1(5.3)	18(94.7%)	
10	24		24(100%)	10	26	1(3.8)	25(96.2%)	
11	32	1(3.1)	31(96.9%)	11	28			28(100%)
12	23		23(100%)	12	37			37(100%)
13	28		28(100%)	13	32			32(100%)
14	25		25(100%)	14	25	1(4.0)	24(96%)	
15	27		27(100%)	15	17			17(100%)
16	28	1(3.6)	27(96.4%)	16	18			18(100%)
17	19		19(100%)	17	20			20(100%)
Total	346	3(0.9)	343(99.1%)	Total	321	3(0.9)	318(99.1%)	
AUH								
Girls N=(553)				Boys N=(394)				
4	61	4(6.6)	57(93.4%)	4	40	4(10.0)	36(90%)	
5	16	1(6.2)	15(93.8%)	5	35	4(11.4)	31(88.6%)	
6	23		23(100%)	6	24			24(100%)
7	41	4(9.8)	37(90.2%)	7	29	1(3.4)	28(96.6%)	
8	41	1(2.4)	40(97.6%)	8	30	1(3.3)	29(96.7%)	
9	38	3(7.9)	35(92.1%)	9	20	2(10.0)	18(90%)	
10	40		40(100%)	10	21	3(14.3)	18(85.7%)	
11	25	2(8.0)	23(92%)	11	25			25(100%)
12	51	1(2.0)	50(98%)	12	27	5(18.5)	22(81.5%)	
13	36	3(8.3)	33(91.7%)	13	26			26(100%)
14	57	2(3.5)	55(96.5%)	14	35	2(5.7)	33(94.3%)	
15	29	14(48.3)	15(51.7%)	15	27	2(7.4)	25(92.6%)	
16	25	10(40.0)	15(60%)	16	29			29(100%)
17	70	1(1.4)	69(98.6%)	17	26	1(3.8)	25(96.2%)	
Total	553	46(9.1)	505(91.3%)	Total	394	25(6.3)	369(93.7%)	

TVM- Trivandrum, AUH- Abu Dhabi

Table-2
The Activity pattern of children based on age and sex

Age	Sex	Time in Hours and Minutes							
		Working Day (Mean)				Holiday (Mean)			
		Sedentary	Moderate	Heavy	Sleep	Sedentary	Moderate	Heavy	Sleep
4-6	Girl	3.4	10.8	2.1	7.5	3.1	10.5	2.8	7.6
	Boy	4.8	7.9	3.6	7.9	5.5	7.9	2.8	7.8
7-10	Girl	4.1	10.0	2.1	7.7	3.2	10.2	2.7	7.8
	Boy	4.4	7.8	3.8	8.1	4.9	7.5	3.4	8.1
11-17	Girl	4.7	8.8	2.8	8.3	4.1	9.1	3.1	7.7
	Boy	4.9	6.4	4.3	8.2	4.5	7.5	3.7	8.2

Here the sample selected were all having above normal level of stress. In order, to understand whether the activity pattern of children had any relationship with their stress, further analysis using Pearson Correlation Coefficient was carried out and the results are presented in table 3 and 4.

Table-3
Correlation of children's stress with their activity pattern based on sex

		GIRL	BOY
Working	Sedentary	0.200**	0.007
	Moderate	-0.307**	-0.195**
	Heavy	0.240**	0.076
	Sleep	0.256**	0.145**
Holiday	Sedentary	0.266**	-0.156**
	Moderate	-0.270**	-0.050**
	Heavy	0.118*	0.125*
	Sleep	-0.023	0.118

p value <.01 = Significant at 1% level (**), p value <.05= Significant at 5% level(*)

Table 4: Correlation of children's stress with their activity pattern based on region

		TVM	AUH
Working	Sedentary	-0.027	0.180**
	Moderate	-0.170**	-0.217**
	Heavy	0.060	0.105*
	Sleep	0.190**	0.222**
Holiday	Sedentary	-0.156**	0.222**
	Moderate	0.123*	-0.284**
	Heavy	0.052	0.134**
	Sleep	-0.019	0.114*

p value <.01 = Significant at 1% level (**), p value <.05= Significant at 5% level(*)

The results revealed that age did not have much influence on the activity pattern and stress of children. It was observed that significant relationship was shown with stress and the amount of time spent for sleep and heavy activities on a working day by children of 7-10 years. This may be because of their studies, they may not get time to sleep properly or that any heavy activity on that day is giving them extra load. In the case of adolescents significant relationship with stress was seen only for

moderate activities done on working days. Other than this no significant relationship was observed for any activities irrespective of age.

Then sex wise and region wise analysis was done. Sex wise analysis revealed that the stress of girls showed significant positive relation with sedentary activities and heavy activities done on working and holiday and also on time spent for sleep on working days. But for boys positive significant relation was noted only for their sleep during working days and heavy activities done on holidays.

Region wise analysis also showed more or less same results. Children of Trivandrum showed significant relation with their stress for activity like sleep on working days and moderate activities done on holidays where as children of Abu Dhabi showed significant relation with stress for activities like sedentary and heavy activities and also hours spent for sleep on both working and holidays. Here only difference with the sex wise comparison was, for the children of Trivandrum, moderate activities done on holidays like study and tuition had significant influence on their stress. It is noted that moderate activities showed negative relationship with stress in all cases indicating that stress reduced when moderate activities increased.

From this, it can be understood that moderate activities which included study and tuition did not give stress to children but sedentary activities like T. V watching, playing or surfing computer etc, increased their stress. It could be that they were given less pressure from elders when they study where as in other activities it may not be the same. Moreover, time spent for sleep on working days and holidays also had great influence on the stress of both girls and boys.

Thus both sex wise and region wise analysis revealed that, lack of proper physical activity with a sedentary lifestyle and lack of sufficient sleep lead to stress in children. Now days, it is a lifestyle or trend among many, to have late dinner, or watching TV or playing computer games for hours or late night and thereby go to bed late. This proved to have great impact on the children's stress and sleeping pattern also. Insufficient sleep at night (at least for 8-9 hours), may cause serious illness in children, affecting their physical, and mental health, thereby causing stress in them. But it was also noted that they sleep for

an average of 6-7 hours a day. This varied according to their daily academic work load and other activities. So, it can be inferred that sleep may not be a reason for stress in them particularly older children and adolescents. There are a few studies contradictory to these results.

According to the study done by Judith Owens, it was seen that clinical experience with both adults and children with sleep problems strongly implicated television-viewing habits as a potentially significant influence on sleep behaviour⁷. In an article published by an unknown author in a journal in a Northwestern University about sleep disorders in preschoolers, it was seen that among 500 preschoolers those who slept less than 10 hours in a 24-hour period (including daytime naps) were 25% more likely to misbehave. They were consistently at greatest risk for "acting out" behavioural problems, such as aggression and oppositional or noncompliant behaviour⁸.

Avi Sadeh in a study conducted among school students found that those "who tended to focus on their emotions and anxiety during the high-stress period were more likely to shorten their sleep, while those who tended to ignore emotions and focus on tasks extended their sleep and shut themselves off from stress"⁹."

Research showed that sleep disturbances in children are not only associated with medical problems (allergies, ear infections, hearing problems), but also with psychiatric and social issues. Similar to the findings of the present study, sleep problems usually decline, as children get older, but these early patterns are the best indicator of future sleep troubles¹⁰.

Weather conditions, safety concerns, and homework/chores were common barriers to physical activity reported by children and adult caregivers¹¹. Reduced outdoor spaces, increased television viewing, and fierce academic competition reduced activity levels in Indian children¹².

WHO reported that modern living has rapidly led to a sedentary life as a consequence of technological advancement. People watch T.V or surf the net glued to their chairs for hours. More and more people now meet neighbors over the telephone or through the e-mail rather than walking across. Similarly, in the case of children also it can be seen that instead of indulging in outdoor activities or play children spent their leisure time sitting before T.V or computer. This can have adverse effect on their physical and psychological health. Here the results indicate that children spent more time to watch T.V or Computer¹³.

From the studies of Otiv et al, it was found that sedentary pursuits like TV and movie watching, video games, internet gazing and telephone gossip sessions are important activities of Indian children¹⁴. In our country, school going children, watch television for 1-4 hours on week days and more than 4 hours on week ends^{15,16,17}.

According to MCHugh, television is one of the biggest sources of continual, low level, "fight or flight" stress in children's and

parents daily life¹⁸. Pfefferbaum et al opined that when children spend a lot of time watching live coverage of traumatic events; their reactions to those would be greater¹⁹. According to Krishnaveni et al children of both sexes spent their leisure time in sedentary activities²⁰.

In a study done on television viewing habits of children the mean time spent on television viewing by children for the whole week was 20.7 hours. The results also pointed that the stress levels of high television viewers were high compared to moderate and light television viewers²¹. Similar results were obtained in a study done by Krishna Roopa²².

Earlier studies have observed lower activities in girls than boys during pubertal and pre-pubertal years and, though others observed no differences in pre-pubertal children²³⁻²⁵. In a study undertaken to assess the physical activity pattern among children and adolescents it was seen that older girls spent their leisure time for sedentary activities, probably due to lack of parental or social support for games. Similar results were reported by Roy²⁶. The present study also gives concurrent results.

It was reported that, involving in some kind of physical activity at least on holidays may help children to lower their stress level. According to a study done by John, lack of physical activity is the major underlying cause of many diseases²⁷. A study done on activity pattern and sedentary behaviours in children, showed that sedentary lifestyle among children is becoming increasingly common and has been linked to future risk of degenerative diseases²⁸.

Now days, children are forced by the parents to join in art related activities like singing, dancing etc as a prestige issue and increase their mane in the society. After studies and time spent for these activities the children are getting no time for play. The present study also agrees with this. Through activities and art forms children can get physical and mental pleasure and encouragement. The tension during competitions and the extra efforts they are forced are making the children physically and mentally too tired so that they lose all interests in play or outdoor activity. This could also be one of the reasons for the reduced play and physical activities in today's children. Also in schools they get very little time for free play the best tension releaser to children. In the words of Sameer Kumar 15 to 20 per cent of children in the UAE over the past five years, are facing problems. He added, "It's stress — there's non-stop parental and peer pressure to perform, whether it's homework, class work, swimming, playtime — even at summer camps. Moreover, sedentary behaviour and low levels of physical activity may, in part, explain the rising prevalence of childhood overweight and obesity²⁹. In a study on behavioural determinants of obesity by Renin, Jhonson and Jebb, in children and adolescents, the most important behavioral determinants of overweight include consumption of energy-dense foods, low levels of physical activity and frequent television viewing and computer use. The

present results also indicated that the children spent major part of their leisure time for moderate activities leading to overweight and obesity³⁰.

Conclusion

The heavy burden of homework, play and books with all work and no play is marking its repercussions in today's children. Physical activity and play should be given equal importance as studies so that the children can get rid of their stress and tension through play. Sports and physical education which include moderate activities should be incorporated in school curriculum so that children can stay healthy and fit with a sound body and mind. Creative activities in children should be encouraged both at school and at home. Interventions related to stress should be organized at school. Teachers should also be given training and guidance to reduce or manage their own stress and those of their students. The study pointed out the need for a school counselor to help children, parents and teachers to guide them to cope up with their stress and stressful situations.

References

1. Bijilakshmi Routray and Sunil Kumar Sathpathy, Stress management of library information science professionals in digital environment, (2002)
2. Swami Nathan M., Principles of Nutrition and Dietetics. The Bangalore printing and publishing company Ltd., Bangalore, 369 (2005)
3. Hurlock Elizabeth. B, Child growth and development, New York: McGraw Hill, 240-242 (1997)
4. Khalid S. Al-Gelban, Depression, anxiety and stress among Saudi adolescent school boys, Department of Family and Community Medicine, College of Medicine, King Khalid University (2004)
5. Misra Ranjita, Michelle Mckean, Sarah West, Tony Russo, June, Academic Stress of College Students: Comparison Of Student And Faculty Perceptions, *College Student Journal*, (2000)
6. Sbaraini C.R. and Schermann L.B., Prevalence of childhood stress and associated factors: a study of schoolchildren in a city in Rio Grande do Sul State, Brazil, Cad. Saude Publica, Rio de Janeiro (2007)
7. Judith Owens, Rolanda Maxim, Melissa McGuinn, Chantelle Nobile, Michael Msall, Television-viewing Habits and Sleep Disturbance in School Children (2003)
8. Anonymous Author, June. 'A Northwestern University Study, Developmental and Behavioral Pediatrics (1999)
9. Avi Sadeh. Dr., June, Associated Sleep Societies annual meeting (2001)
10. Stein M., Mendelsohn J., Obermeyer W.H. and Amromin J., Benca R., April. Sleep and Behavior Problems in School-Aged Children Pediatrics, 107: e60
<http://www.pediatrics.org/> (2001)
11. Janice L. Thompson, Sally M. Davis, Joel Gittelsohn, Scott Going, Alberta Becenti, Lauve Metcalfe, Elaine Stone, Lisa Harnack and Kim Ring, Patterns of Physical Activity Among American Indian Children: An Assessment of Barriers and Support', *Journal of Community Health*, 26(6), 423-445 (2010)
12. Bhave S., Bavdekar A., Otv M. IAP, National task force for childhood prevention of adult diseases: Childhood obesity, *Indian Pediatric*, 41, 559- 575 (2004)
13. World Health Organization, World Health Report. Reducing risks, promoting healthy life (2002)
14. Otv M., Bavdekar A. and Bhave S., IAP National Task Force for Childhood Prevention of Adult Diseases: Childhood Obesity, *Indian Pediatrics*, 41, 559-575 (2004)
15. Chawla, Television viewing survey. Operational Research Group, Baroda (1986)
16. Nirmala C., Impact of Soya Extracted food supplement on the nutritional status of women beneficiaries of ICDS, Ph.D. thesis, Kerala Agricultural University, Vellanikara. Thrissur, 12 (2004)
17. Arya Kalpana, Time spent on television Viewing and its effect on changing values of school going children, *Anthropologist*, 6(4), 269-271 (2004)
18. McHugh Beth, Stress and television (2006)
19. Pfefferbaum B., Nixon S.J. and Tivis R., Television exposure in children after a terrest incident, *Psychiatry*, 64(3), 202-211 (2001)
20. Krishnaveni G.V., Accelerometers for measuring physical activity behavior in Indian children, *Indian pediatrics*, 46, December 17 (2009)
21. Komala M. and Rudramma, Television Viewing among Children- A study on association of television viewing with stress and academic performance of children, Proceedings of the UGC sponsored national seminar – Resolving Stress to optimize Academic Achievement – the Innovative Role of Teachers, 12th, 13th, and 14th November 2008 (2008)
22. Krishna Roopa, Determinants of dietary profile of higher secondary school children. Department of Home Science College of Agriculture, Trivandrum. M.Sc. Thesis (2003)
23. Dencker M., Thorsson O., Karlsson M.K., Linden C., Svensson J. and Wollmer P., Daily physical activity in Swedish children aged 8-11 years, *Scand J Med Sci Sports*; 16, 252-257 (2006)
24. Eiberg S., Haaselstrom H., Gronfeldt V., Froberg K., Svensson J., Andersen L.B., Maximum oxygen uptake and objectively measured physical activity in Danish

- children 6-7 years of age: the Copenhagen school child intervention study, *Br J Sports Med*; **39**, 725-730 (2005)
- 25.** Grund A, Vollbrecht H, Frandsen W, Krause H, Siewers M, Rieckert H., No effect of gender on different components of daily energy expenditure in free living pre-pubertal children, *Int J Obes Relat Metab Disord*; **24**, 299-305 (2000)
- 26.** Roy S. and Dasgupta A., Physical activity pattern among the adolescents of a rural community in West Bengal, *Indian J Community Med.*, **34**, 366-7 (2009)
- 27.** John G., Consumption pattern of fast foods among urban people, *Indian J. Community Medicine*, **4**, 34–40 (1999)
- 28.** Labros S. Sidossis, Demosthenes B. Panagiotakos, Eirini Bathrellou, Chrystalleni Lazarou, *Central European Journal of Public Health, Excerpt from Article: Cent Eur J Public Health*; **15**(2), 66-70 (2007)
- 29.** Sameer Kumar Dr., Gulfnews.com August 03 (2010)
- 30.** Rennie K.L., Johnson L., Jebb S.A., Behavioural determinants of obesity, *Best Pract Res Clin Endocrinol Metab*.**19**, 343–58 (2005)