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RESEARCH ARTICLE

TELEVISION WATCHING, DIETARY AND SEDENTARY BEHAVIORS AND OBESITY: OBSERVATIONS FROM A SEMI RURAL INDIAN POPULATION

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ABSTRACT: Background: Obesity is considered to have increased in epidemic proportions throughout the globe, more so in developing countries like India. Obesity is primarily associated with sedentary lifestyle with poor dietary choices and less physical activity. Television is one of the sedentary activities is often associated with consumption of oily foods. This has compounded the problem of obesity and lead to associated health problems including hypertension, diabetes and metabolic syndrome. **Results:** The questionnaire study involved 369 subjects in a rural setup. Majority of the studied population watched TV and major chunk of them were middle aged people. The time involved in TV viewing was higher in the same population, which is a sedentary form of activity. Statistical correlation was observed between education, income status, oily food consumption and Television viewing. Physical activity was notably higher in the non-TV viewing subjects. BMI, which is measure of obesity, was increased in the TV viewers, coupled with lifestyle disorders like Diabetes, Hypertension and arthritis. Alcohol and tobacco usage too was shown to increase with Television viewing. The dietary choices of TV watching subjects were of less nutritive value with more sugar and oil consumption. **Conclusion:** Indian studies correlating television viewing and obesity in the adult population are lacking. The study shows a significant correlation of increased TV viewing with obesity in the middle-aged population and the associated health problems related to it.

KEYWORD: Television, dietary, sedentary behaviors, body mass index (BMI), obesity.

INTRODUCTION:

Obesity measured using BMI have been the major cause of morbidity and have risen to unacceptable levels in both developed and the developing world [1].

Obesity has been noted to the fourth most common cause of mortality worldwide in 2017 [2]. The incidence of obesity is increasing by the day all over the globe [3]. The global obesity epidemic has now ravaged developing countries especially South and South East Asia [4].

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The prevalence of obesity in India varies due to age, gender, geographical environment and socio-economic status. According to ICMR-INDIAB study 2015, the prevalence rate of obesity and central obesity from 11.8% to 31.3% and 16.9% to 36.3% respectively [5]. Sedentary activities are defined as those incurring no more than 1.5 metabolic equivalents and involve activities like sitting and lying down [6-7]. Television watching often performed sitting or lying down, is one of the most prevalent sedentary activities of daily living in industrialized societies and studies have shown adults spend 40 to 50 % of their free time indulging in TV viewing [8]. Among sedentary activity, television viewing had a lower metabolic rate and was regarded to be worse than activities as sewing, playing board games, reading, writing, and driving a car [9].

Various studies have indicated that prolonged Television viewing is associated with lifestyle disorders like obesity, Type 2 diabetes mellitus, metabolic syndrome in adults [6, 10-11]. Television viewing is often associated with eating unhealthy foods that are high in trans fats and sugars like chips, cookies and soft drinks and often constant marketing of such products on the TV, has increased the consumption of them [12]. Blanck et al, 2006 have shown prospective weight gain after increased television usage, especially in post-menopausal women [13].Studies indicate that the increased TV viewing in adolescence often translates to an increase in screen time as young adults are often co-associated with increased BMI [8]. In the current community based study an attempt is made to understand the relation between a sedentary activity like TV viewing and obesity.

MATERIALS AND METHODS:

This was a cross-sectional survey and was conducted in the villages of Inoli, Killur, Belma, Netila Padav, Padolikatte, Balipaguri and Maritimule areas of Konaje in Mangalore Taluk of Dakshina Kannada District of Karnataka, India from October 2016 to June 2017. The study areas selected were all within a 10 kilometers distance and had severe problems availability of electricity, internet connections and navigable roads. One of the investigators, who is a trained medical social worker and a resident of the study area undertook the study. The inclusion criterion was adults above 18 years, individuals who were original residents of the place. The exclusion criteria included people who were not residents of Konaje, people who were physically disabled or bed ridden, and women who were pregnant or had given birth during the six months preceding the survey.

Screening was done by a house-to-house visit and a total of 98 households were selected using systematic sampling of every 10th house having electricity and television in the area. Systematic sampling was not done for houses not having a television. The ultimate sampling units were the households and two individuals in the age group of 30–70 years residing in the selected household. The proforma contained questions needing information on socio demographic, diet, educational, and behavioral information on tobacco and alcohol use, diet, physical activity, history of chronic diseases, TV watching. The physical measurements height and weight were collected using a foldable tape to provide accurate measurements (to the nearest 0.1 cm) and a weighing balance. The data on weight and height were used in calculating the body mass index (BMI). A BMI of less than 18.5 kg/m^2 was considered underweight, a range of 18.5 to 24.9 kg/m2 as normal, 25.0 to 29.9 kg/m2 as overweight, and more than 30.0 kg/m2 as obese in accordance to the WHO guidelines [14].

Statistical analysis

Data were entered in the Microsoft Excel, and the answers on the questions were subjected to a quantitative analysis using frequency and percentage. The data were stratified based on the TV watching and the data were subjected to Chi-square test using SPSS programme (IBM version

22, Chicago Inc., IL, USA). P < 0.05 was considered statically significant.

RESULTS :

A total of 38 houses that were not having a television and 82 houses having television were selected and the study was performed. In the studied population, the majority of 61 males (56%) were not in the habit of watching TV, in contrast to 48 females (44%) (**Table 1**). The same male preponderance was also observed in the population not watching TV at 68.5% (**Table 1**). In the data tabulated, the populations in the age group of 41-50 (40.7%) were the most involved in viewing TV, albeit the trend of not watching TV was also observed in the same age group (38%) (**Table 1**). However, the elderly population studied was not in the habit of watching TV (20%) in comparison to all the remaining age groups (**Table 1**). The bulk of the population studied (43.5%) watched TV for 61-120 minutes, and a minority (2.7%) watched for less than 30 minutes per day (**Table 1**). In the study 82.7% of the subjects consumed lunch while watching TV and 86.5% liked to eat oily foods while watching TV (**Table 1**). It is also observed that subjects who did have any formal education did not watch Television (77.6%) compared to subjects who were educated up to the 10thstandard (43.8%) (**Table 1**).

A study of TV viewing concerning income status shows that subjects in the income category below INR 5000did not watch TV in most cases compared to that above the income category of INR 10,0000 and had statistical significance (P=0.0012) (**Table 1**). In terms of occupation, a significant percentage of people engaged in occupations requiring mild physical activity (**Table 1**) were not in the habit of watching TV (74.3%), but the same groups also were in the habit of watching TV in 78.8% of the cases (**Table 1**).

Table 1: The demographic details of the study population that watched TV and did not watch TV

Parameters	Group	No TV watching	With TV Watching	
Gender	Male	61 (56)	178 (68.5)	0.02
	Female	48 (44)	82 (31.5)	
Age	31-40	24 (22.1)	59 (22.7)	0.6
	41-50	42 (38.5)	106 (40.7)	
	51-60	21 (19.2)	57 (21.9)	
	>61	22 (20.2)	38 (14.6)	
Watching TV	No	109 (100)	7 (2.7)	
	0-30 min	0 (0)	40 (15.4)	
	30-60 min	0 (0)	89 (34.2)	
	61-120 min	0 (0)	113 (43.5)	
	>120 min	0 (0)	11 (4.2)	
Lunch + TV	No	109 (100)	45 (17.3)	
	Yes	0 (0)	215 (82.7)	
Oily food + TV	No	109 (100)	35 (13.5)	
	Yes	0 (0)	225 (86.5)	
Religion	Hindu	106 (97.2)	251 (96.5)	
	Muslim	2 (1.8)	2 (0.8)	
	Christian	1 (0.9)	7 (2.7)	
Education	Uneducated	84 (77.06)	75 (28.8)	
	Less than 10th	24 (22.01)	114 (43.8)	
	Above 10th	1 (0.91)	71 (27.4)	
Income	Less than 5,000	66 (59.4)	110 (42.3)	0.0012
	50001 to 10,000	43 (39.4)	90 (34.6)	
	More than 10,000	1 (09.1)	60 (23.1)	
Occupation	Sedentary (office, priest, professional, shop owner etc)	5 (4.58)	31 (11.9)	0.0011
	Mild physical work (office boy, driver, carpenter)	81 (74.32)	205 (78.8)	
	High physical work (coolie, farmer, factory etc)	23 (21.1)	23 (8.8)	

Table 2: The body type, BMI, sedentary life style and health issues in the study population

Parameters	Group	No TV	With TV	
Body type	Endomorph	2 (1.8)	18 (6.9)	0.0012
	Mesomorph	48 (44)	151 (58.1)	
	Ectomorph	59 (54.1)	91 (35)	
BMI	< 20	45 (41.28)	48 (18.46)	0.0001
	20.1 to 22	33 (30.27)	61 (23.46)	
	22.1 to 24	18 (16.51)	47 (18.07)	
	More than 24	13 (11.92)	104 (40)	
Fasting	No	96 (88.1)	188 (72.3)	0.0018
	Yes	14 (11.9)	72 (27.7)	
Frequency of fasting	No	96 (88.1)	188 (72.3)	0.004
	Weekly once,	3 (2.8)	21 (8.1)	
	Occasionally	10 (9.2)	51 (19.6)	
Daily physical activity	No	2 (1.8)	34 (13.1)	0.008
	Yes	107 (98.2)	226 (86.9)	
Health problem	Nil	79 (72.4)	145 (49.15)	0.034
	Diabetes	7 (6.4)	42 (14.2)	
	Hypertension	13 (11.9)	48 (16)	
	Arthritis	4 (3.6)	16 (6.1)	
	Asthma	6 (5.5)	15 (5.7)	
	Gastric issues	4 (3.6)	15 (5.7)	
	Other issues	9 (8.2)	14 (5.3)	
Number of illness	No health problem	79 (72.4)	145 (49.15)	0.005
	One health problem	22 (20.8)	71 (24.07)	
	Two or more health problem	8 (7.3)	45 (15.25)	

The body type of most people not watching TV is of the ectomorph type (54.1%) and in comparison, to the mesomorph type (58.1%) who watched TV and there is a significant statistical significance between body type and TV viewing ($p = 0.0012$) (**Table 2**). Similarly, a highly significant correlation between TV viewing and the calculated BMI is observed ($p<0.001$) with the subjects BMI increasing with TV viewing, i, e BMI (< 24) is seen in 40% of the cases (**Table 2**). But the BMI of subjects not watching TV is (>20) is 41.2% (**Table 2**). Sedentary activity is notable more commonly in subjects watching TV (13.1%) in comparison to non-TV viewers (2%), and a significant statistical significance is observed between TV viewing and daily physical activity (**Table 2**). The majority of the subjects not watching TV had no health issues (72%), in comparison to the population used to watching TV, were diabetes (14.2%), hypertension (16%), arthritis (6.1%), gastric issues (5.7%) and asthma (5.7%) were more common and hence there is a statistical significance with heath issues and TV watching (**Table 2**). There is also a statistical significance between the number of illnesses per year with TV watching ($p = 0.005$), and the number of episodes of illness being more in TV viewers (**Table 2**).

Table 3: The frequency and quantity of beverages consumed by the study population

Parameters	Group	No TV	With TV
Tea Frequency	No	13 (11.9)	20 (7.7)
	Once a day	36 (33)	65 (25)
	Twice a day	59 (54.1)	175 (67.3)
Tea Quantity	No	13 (11.9)	19 (7.3)
	One cup	36 (33)	64 (24.6)
	Two cups	52 (47.7)	151 (58.1)
	Four cups	8 (7.3)	26 (10)
Milk Frequency	No	85 (78)	158 (60.8)
	Once a day	20 (18.3)	90 (34.6)
	Twice a day	4 (3.7)	12 (4.6)
Milk Quantity	No	85 (78)	157 (60.4)
	One cup	20 (18.3)	91 (35)
	Two cups	4 (3.7)	12 (4.6)
Butter milk Frequency	No	92 (84.4)	163 (62.7)
	Once a day	14 (12.8)	87 (33.5)
	Twice a day	3 (2.8)	10 (3.8)
Butter Milk Quantity	No	92 (84.4)	162 (62.3)
	One cup	13 (11.9)	86 (33.1)
	Two cups	4 (3.7)	11 (4.2)

In the studied population, tea and milk drinking with increased frequency is common in the TV viewing subjects, compared to buttermilk in non-TV

viewing subjects (**Table 3**). Rice-based diets are more common in TV-watching subjects, including eating rice and rice-based breakfast items like Idlis and Dosa (**Table 4**).

Table 4: The frequency and quantity of staple diet consumed by the study population

Parameters	Group	No TV	With TV	
How many times do you have rice/day	Once	4 (3.7)	19 (7.3)	
	Twice	93 (85.3)	235 (90.4)	
	Thrice	12 (11)	25 (9.6)	
The quantity of rice you eat	< 100 g	3 (2.8)	11 (4.2)	0.91
	100-150 g	69 (63.3)	160 (61.5)	
	151-200 g	36 (33)	86 (33.1)	
	201 - 300 g	1 (0.9)	3 (1.2)	
How regularly do you have rice-based Breakfast (idle, dosa, etc) a week	Daily	48 (44)	102 (39.2)	0.80
	5 days in a week	9 (8.3)	24 (9.2)	
	3-5 d/w	32 (29.4)	87 (33.5)	
	< 3 days/week	20 (18.3)	47 (18.1)	
Do you eat konji/ganji (Rice stew)	No	39 (35.8)	129 (49.6)	0.035
	Daily	61 (56)	100 (38.5)	
	3-5 d/w	5 (4.6)	12 (4.6)	
	< 3 d/wk	2 (1.8)	11 (4.2)	
	Rarely in a year	2 (1.8)	8 (3.1)	
Do you eat wheat items chapathis/ puri/ roti	Daily	8 (7.3)	28 (10.8)	0.03
	5-3d/w	5 (4.6)	15 (5.8)	
	2- 1 d/wk	11 (10.1)	57 (21.9)	
	4 to 6 times a month	51 (46.8)	103 (39.6)	
	On occasions	34 (31.2)	57 (21.9)	
What is the quantity of puri/ pulka/ roti you eat each time	< 25 g	44 (40.4)	25 (9.6)	
	25-50 g	47 (43.1)	138 (53.1)	
	51-100 g	18 (16.5)	96 (37)	
How often do your sweets and ice cream	Never/rarely	4 (3.7)	7 (2.7)	0.0001
	1-2 d/w	3 (2.8)	24 (9.2)	
	3-4 d/w	52 (47.7)	16 (6.2)	
	Daily	50 (45.8)	213 (81.9)	
How often do you eat Oily food like chips, samosa, Bonda etc	Rarely	10 (9.1)	25 (9.6)	0.0004
	1-2 d/w	40 (36.6)	49 (18.8)	
	3-4 d/w	33 (30.2)	74 (28.4)	
	Daily	26 (23.8)	112 (43.1)	

However, rice stew, a healthier diet option, is observable more in the non-TV viewing population (**Table 4**). A similar trend is observed in wheat items, where the TV watching population seems to relish it more. Sugar rich foods with a high glycemic index like sweets and ice cream were consumed more daily (81%) by TV viewers and a high significance was noted in this particular trait ($p<0.001$), and a similar inclination is noted for oily foods like bondas, samosa (43%) daily (**Table 4**). However, healthier food options in the form of fruits and vegetables were also consumed more by the TV viewing population compared to the non-TV viewers (**Table 5**). Non-Vegetarian items like fish, chicken, mutton, pork and beef were consumed more frequently by TV viewers (**Table 6**). However, on noticing the alcohol drinking, smoking and paan, gutka eating pattern, the frequency and quantity is more in the non-TV viewers except for alcohol consumption, where the quantity of alcohol consumed by TV viewers, especially hard liquor, is more (**Table 7**).

Table 5: The frequency and quantity of fruits consumed by the study population

Parameters	Group	No TV	With TV	
How often do you eat fruits	Never/rarely	72 (66.1)	86 (33.1)	0.0001
	1-2 d/w	25 (22.93)	100 (38.5)	
	3-4 d/w	5 (4.6)	31 (11.9)	
	Daily	4 (3.7)	43 (16.5)	
What quantity of fruits do you eat in each time	Never/rarely	72 (66.1)	86 (33.1)	0.0001
	< 25 g	18 (16.5)	92 (35.4)	
	26-50 g	18 (16.5)	74 (28.5)	
	> 50 g	1 (0.9)	8 (3.1)	
Which fruit eaten most	Banana	72 (66)	210 (80.7)	0.0001
	Grapes	17 (15.6)	185 (71.1)	
	Oranges / musumbi	4 (3.7)	153 (58.8)	
	Pineapple	6 (5.5)	81 (31.1)	
	Watermelon	8 (7.3)	185 (71.1)	
	Papaya	45 (41.3)	28 (10.7)	
	Chikoo	25 (22.9)	34 (13.1)	
	Mango	84 (77.1)	235 (90.3)	
	Jack fruit	70 (64.2)	194 (74.6)	
	Others	20 (18.3)	28 (10.7)	
How often do you eat raw vegetables	Never	97 (87.15)	194 (74.6)	0.02
	1-2 d/w	8 (7.3)	47 (18.1)	
	3-4 d/w	2 (1.8)	13 (5)	
	Daily	2 (1.8)	6 (2.3)	
What quantity of raw vegetables do you eat in each time	Never	95 (88.1)	193 (74.23)	0.03
	< 25 g	7 (6.4)	44 (16.92)	
	26-50 g	6 (5.5)	22 (8.46)	
	> 50 g	1 (0.92)	1 (0.38)	
Which raw vegetables do you eat the most	Never	97 (89)	194 (74.6)	0.0001
	Tomato	10 (9.2)	60 (23.1)	
	Carrots	13 (11.9)	57 (21.9)	
	Onions	14 (12.8)	48 (18.4)	
	Cucumber	15 (13.7)	66 (25.3)	
	Germinated grams	2 (1.83)	60 (23.1)	

Table 6: The frequency and quantity of egg, fish and meat consumed by the study population

Parameters	Group	No TV	With TV	
Egg frequency	Never	24 (22)	42 (16.2)	0.17
	1-2 d/w	76 (69.72)	177 (68.1)	
	3-4 d/w	5 (4.6)	27 (10.4)	
	Daily	4 (3.7)	14 (5.4)	
Egg quantity	Never	24 (22)	42 (16.2)	
	1	39 (35.8)	31 (11.9)	
	2 or more	24 (22)	43 (16.6)	
Fish frequency	Never	21 (19.26)	27 (10.38)	0.02
	1-2 d/w	38 (34.86)	86 (33.07)	
	3-4 d/w	35 (32.11)	89 (34.23)	
	Daily	6 (5.5)	42 (16.15)	
	Very rarely	9 (8.25)	16 (6.15)	
Fish quantity	Never	21 (19.3)	27 (10.4)	0.0001
	< 25 g	5 (4.6)	46 (17.7)	
	26-50 g	81 (74.31)	175 (67.3)	
	> 50 g	2 (1.83)	12 (4.6)	
Chicken frequency	Never	25 (22.9)	49 (18.8)	0.0001
	1-2 d/w	25 (22.9)	96 (36.9)	
	3-4 d/w	2 (1.8)	13 (5)	
	Once a week	57 (52.3)	2 (0.8)	
Chicken quantity	Never	25 (22.9)	49 (18.8)	0.0003
	< 25 g	8 (7.3)	58 (22.3)	
	26-50 g	70 (64.22)	151 (58.1)	
	> 50 g	6 (5.5)	2 (0.8)	
Mutton frequency	Never	88 (80.7)	208 (80)	
	Once in a week	1 (0.9)	4 (1.5)	
	Rarely	20 (18.3)	48 (18.5)	
Mutton quantity	Never	88 (80.7)	208 (80)	
	< 25 g	1 (0.9)	1 (0.4)	
	26-50 g	20 (18.3)	51 (19.6)	
Pork frequency	Never	105 (96.3)	224 (86.2)	
	1-2 days a month	4 (3.7)	2 (0.8)	
	1-2 days a week	0 (0)	34 (13.1)	
Pork quantity	Never	105 (96.3)	224 (86.2)	
	< 25 g	4 (3.7)	35 (13.5)	
	26-50 g	0 (0)	1 (0.4)	
Beef frequency	Never	108 (99.1)	255 (98.1)	
	1-2 d/month	1 (0.9)	5 (1.9)	
Beef quantity	Never	108 (99.1)	255 (98.1)	
	25-50 g	1 (0.9)	5 (1.9)	

Table 7: The frequency and quantity of tobacco and alcohol usage by the study population

Parameters	Group	No TV	With TV	
Smoking frequency	No	93 (85.3)	248 (95.4)	0.007
	1-5	4 (3.7)	3 (1.2)	
	6-10	8 (7.3)	3 (1.2)	
	11-20	2 (1.8)	2 (0.8)	
	21-25	2 (1.8)	4 (1.8)	
Paan/Gutka frequency	Never	44 (40.36)	126 (48.46)	0.19
	Rarely on occasions	17 (15.59)	42 (16.15)	
	Daily	37 (33.94)	58 (22.3)	
	2- 1 week	8 (7.34)	21 (8.07)	
	5-3 week	3 (2.75)	13 (5)	
Hard drink frequency	Never	85 (78)	238 (91.5)	0.0004
	Daily	20 (18.4)	12 (4.6)	
	5-3 week	1 (0.9)	2 (0.8)	
	2- 1 week	3 (2.7)	8 (3.1)	
Quantity	Never	85 (78)	238 (91.5)	0.002
	30 (one peg)	5 (4.6)	5 (1.9)	
	60 (two pegs)	12 (11)	5 (1.9)	
	90 (3 pegs)	4 (3.7)	6 (2.3)	
	Quarter	1 (0.9)	4 (1.5)	
	>180	2 (1.8)	2 (0.77)	
Beer frequency	Never	64 (60.37)	213 (81.92)	0.14
	Rarely	21 (19.81)	22 (8.46)	
	2- 1 week	3 (2.83)	14 (5.38)	
	Occasions	18 (16.98)	11 (4.23)	

DISCUSSION:

Anthropometric characteristics like height, weight, and body mass index (BMI)are today the most important and accepted indicators of weight-related health problems [15]. BMI and weight indicate the lifestyle of the individual and has been extensively used in both clinical and community-based studies. India is in the midst of a demographic, epidemiological, and nutrition transition. A growing population, increasing urbanization, a shift in the patterns of diseases and changes in lifestyle characterize this transition [16]. The past two decades have seen a dramatic increase in lifestyle-related chronic diseases including obesity, diabetes mellitus, cardiovascular disease, hypertension, stroke, and all cancers [14]. Once considered a problem related to affluence, obesity is fast increasing and a significant proportion of overweight and obese people now coexist with those who are undernourished [17]

Urbanization has been linked to increased Western food consumption in many developing societies as the process of urbanization automatically brings with it changes in dietary practices and physical activity pattern [14, 17-22]. In India, the level of urbanization is still comparatively low (31.2% according to the Census of India 2011) [23], and thus there is considerable scope for increasing urbanization and population concentrations in the larger cities. Globalization, which has made cheap vegetable oils and fats widely available greatly increasing fat consumption in all nations [24], is also contributing to the rise of obesity in India. In the near future, therefore, obesity is likely to emerge as a challenge to the health system in India.

Studies discussing the relation between TV viewing and obesity in the Indian context are less in comparison to western studies. Studies in developed countries indicate the females are more in the habit of watching television and have predicted a weight gain in high-income women [25] and also in post-menopausal women [13]. However, this phenomenon was not observed in the present study because of the patriarchal nature of Indian families, where the women generally more restricted to cooking and household duties. Though Television viewing is a common habit in the household involving all age groups,the adolescent population in recent times are more involved in gaming and computer viewing than television [10] and hence the middle-aged bias towards Television has been observed. A study done in Australia postulates that an hour increase in television watching is associated with an 11 % and 18 % increase in all-cause and CVD mortality in adults respectively. The study further elaborates that

more than 4-hour TV watching was noted to have an 80 per cent increase in Cardiovascular mortality and it was found independent of other risk factors like hypertension, diabetes and metabolic syndrome [12, 26]. European studies reports that TV viewing and in adolescence were associated with adiposity, triglycerides, and metabolic syndrome z-score in young adulthood [27, 28].

A review was done in the USA showed an intensification in risk with the number of hours per day of TV viewing for both type 2 diabetes and heart disease; the association with all-cause mortality appeared more with TV viewing time of greater than 3 hours per day [8]. The present study has a major chunk of people having a screen time at 2 hours, which appears to less than the global average, however, this of concern in future. Studies conducted in Finland and Japan have shown that highly educated and persons of high economic status, especially in old age tend to be more physically active and spend less leisure time watching TV [29- 32] and this view is consistent with our findings, where a minority of the persons with high education status watched TV.

Studies from the Indian subcontinent accounts that urban woman tend to watch Television more than rural women, which may be attributed to better access to electricity and cable television connections as indicated in earlier studies [2, 33]. Verrecken et al 2006 describe in a study that adolescents who watched more TV were more likely to consume sweets and soft drinks daily and less likely to consume fruit and vegetables and these findings were consistent with a study conducted by Harris et al., 2009 [12, 34]. This may also be attributed to the constant advertising of junk food on Television and studies have shown that children consumed 45% more food when exposed to such advertisements [12, 34]. Similar findings have also been noted in Indian children [35]. Previous studies have shown that obesity results from excess energy intake, inadequate physical activity, and sedentary lifestyle [18, 36].Consistent associations have been noted with TV viewing, among older adults, and for pre-adult sedentary behavior to increase the risk of obesity in adulthood [37].

Studies reported from the UK have postulated that overweight and obese adults report low levels of physical activity, high TV viewing sleep duration [26].These factors had a compounding effect in the ongoing COVID-19 pandemic [38]. An another study conducted in the UK, >2.5 hours of TV was shown to be associated with a mean BMI of 27.86as compared with 26.26recorded in adults who reported watching fewer than 2.5hours of TV [31]. This was consistent with the findings observed in our study. Metabolic syndrome includes abdominal obesity, glucose intolerance, dyslipidemia, and hypertension, with insulin resistance and is a major cause of morbidity in all adult populations [28]. A study conducted in the Caribbean reported that the prevalence for the metabolic syndrome was 50.1 and 56.9% among Puerto Ricans and Dominicans, respectively and this was significantly associated with television viewing. Increased television viewing was associated with a 19% greater likelihood of having the metabolic syndrome [39]. Additionally, Gardiner and coworkers have observed that metabolic syndrome was highest in women watching television [40]. The author further postulated that Television viewing time was associated with lower high-density lipoprotein cholesterol (HDL-C) levels and glucose intolerance in women, and this was associated with abdominal obesity in both sexes. Cassidy et al further positively correlate increased BMI with Television viewing [40]. All these studies do seem to confirm and reaffirm the findings in the present study.

Metabolic syndrome is closely associated with lifestyle factors, including low physical activity (PA) levels [28]. A study conducted in 2015, summarizes that mortality benefits for increasing MVPA (moderate to vigorous physical activity) were good and the benefit was observed for those who watched little television and engaged in MVPA at least 1 h/wk [41]. The study further reports that reducing television viewing from 5 + h/day to 3–4 h/d was associated with a 15 % reduction in

mortality risk (CI:0.80, 0.91)and decreasing to <3 h/day resulted in a 12 % lower risk. Conversely, adults who increased their viewing time to 3–4 h/day had a 17 % greater mortality risk and those who increased to 5+ h/day had a 45 % greater risk compared to those who consistently watched <3 h/day.

A study conducted on a population of elderly people in Japan found that older adults who spent less time watching TV were less likely to be overweight or obese, regardless of their levels of MVPA. This reiterates the view that prolonged TV viewing elevates the risk of overweight/obesity among the elderly population. [42] Studies from India and Bangladesh have shown the correlation between obesity and Television in urban and rural population. [2, 33] All the findings appear to be consistent with our study. However, our study shows that in the Indian urban scenario it is more the sedentary lifestyle that is responsible for the increase in overweight and obesity among women. A significant increase in the mean BMI level was found among women who had a maid in their house to do all the household chores and who were less involved in physically intensive household chores such as sweeping and swabbing, cleaning utensils, cooking, and washing clothes.

Television-watching for long duration also came out as an important factor for weight gain among women. Watching TV not only reduces physical activity, but also tends to be associated with consumption of fast foods and junk snacks. On the other hand, monthly ghee or sugar consumption patterns have not shown any association with an increase in the mean BMI status of women. This may in part be due to imprecise measurement of these indicators. These indicators were collected at the household level and may be subject to reporting bias and other measurement errors. A larger increase in mean BMI status was found among women who frequently consumed junk foods or food items containing relatively more sugar and fats. A separate analysis for more than a 2.0-point increase in the mean BMI during the four years in question also substantiates the role of junk foods and food items containing more sugar and fats in increasing BMI levels among women.

Swedish studies postulate that, different TV programs elicit different levels of concurrent food intake, and that the degree to which a program is engaging (or alternately, boring)is related to that intake [43]. Engels et al., 2009showed a causal link between exposures to drinking models on acute alcohol consumption. The models could be based on characters consuming alcohol on-screen or songs that glorify the consumption of alcohol on television. This statistical significance was noted in the present study. A Belgian study observed that higher levels of television viewing were related to earlier onset of smoking behavior in adolescents [44] and tobacco usage is noticeably high in the present study too.

CONCLUSION:

Television is a boon and bane for modern society. It has increased awareness and serves as an important medium to access information and a source of entertainment. However excessive use of television has concurrently shown to increase the incidence of obesity and the resulting diseases associated with namely diabetes, hypertension and metabolic syndrome. The present Indian study has shown a consistent statistical correlation between excessive television usage with poor dietary choices and less physical activity. Through the present study, the authors hope to highlight these facts to the health authorities and hope more prospective multi-centric studies can be conducted on this particular area in India.

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