

# Clustering of health-related behaviours and health outcomes among medical students in KIMS, Hubballi

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## Abstract

**Introduction:** Health-related behaviours such as smoking, alcohol use, excessive screen time and unhealthy nutritional habits cluster together and contribute significantly to the public health burden. A better insight in the clustering of those behaviours can help to identify groups who are at risk in developing chronic diseases.

**Objectives:** To assess the health-related behaviours and outcomes among the undergraduate medical students of KIMS, Hubballi. To identify the pattern of clustering of health-related outcomes, behaviours and socio-demographic factors among them.

**Methodology:** A cross-sectional study was conducted on 300 MBBS students of KIMS, Hubballi for duration of one month. A Two-Step Cluster Analysis was used to identify groups of participants with similar behavioural patterns and health-related outcomes.

**Results:** Cluster analysis identified three clusters of medical students. 85.4% of cluster-1 consume/smoke tobacco as compared to 8.9% from cluster-2 and 0.8% from cluster-3. The mean SAS scores for cluster 1, 2 and 3 were 41.90, 31.57 and 31.08 and the SDQ scores were 20.44, 13.94 and 13.83 respectively. Having healthier patterns of behaviour was associated with lower levels of psychological distress and better physical health.

**Conclusion:** Health related behaviours and outcomes occurred in clusters. Therefore, to develop effective prevention strategies, it is essential to consider multiple health indices when identifying high risk groups.

**Keywords:** Clustering, smart-phone addiction, health related behaviours, young adults.

## Introduction

Health-related practices such as smoking, alcohol use, over the top screening time, lack of physical activity and unwholesome nutritional habits contribute greatly to the public health burden of major current day illnesses like diabetes, cardiovascular disease and psychosocial disorders which begins amid youth leading to impaired adult health<sup>[1,2]</sup>. There is significant evidence that unhealthy practices, particularly, tobacco smoking, alcohol abuse, unhealthy diet and physical inactivity, may simultaneously involve the same subject<sup>[3-8]</sup>. A remarkable feature of health-related behaviours is their tendency to occur in clusters, and such clusters are not randomly distributed at the population level<sup>[9,10]</sup>. WHO estimates that 70% of premature deaths among adults are due to behaviour (smoking, illicit drug use, careless driving) initiated

during adolescence<sup>[11]</sup>. In India, smartphone users account for 530 million in 2018<sup>[12]</sup>.

Public health actions focusing on single unhealthy behaviours could have an effect on unrelated behaviours, but it would be probably far better if the effect of comparable interventions is done on interrelated behaviour<sup>[13]</sup>. Interventions that tackled clustered health behaviours concurrently have been shown to be more effective as well as more cost efficient<sup>[14-16]</sup>.

Since adolescence/young adult is a critical period during lifetime in adopting health behaviours and those behaviours may track into adulthood, the study of multiple health indices should be given utmost importance in public health<sup>[17]</sup>. However not much is known about the clustering of the health behaviours and the association with socio-demographic

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factors because researchers had focused more on the prevalence of each one of these health-related behaviours and their associated demographic features separately. Hence, a better knowledge in the clustering of those behaviours would help to identify those clusters who are at risk in developing unhealthy lifestyles<sup>[17]</sup>. Thus, the aim of the present study was to analyse health-related behaviours and outcomes among the MBBS students of KIMS-Hubballi and to identify the pattern of clusters between health-related outcomes behaviours and outcomes.

### Methodology

A cross sectional study was conducted among the MBBS students of KIMS, Hubballi, during April-May 2019. Taking standard deviation of SAS-SV score of 8.34 based on the study conducted on Smartphone and Smartphone addiction among young people in Switzerland<sup>[18]</sup>, the minimum sample size required to estimate the mean SAS-SV score with 95% confidence and within 1 points of the true value is 268. It was calculated using the formula  $n = Z^2_{1-\alpha/2} \sigma^2 / d^2$  where  $Z_{1-\alpha/2}$  is Z value for 95% confidence,  $\sigma$  is Standard deviation of SAS-SV score,  $d$  is absolute precision. A final sample of 300 randomly selected medical students was included in the study.

**Inclusion criteria:** All MBBS students from phase one to four studying in KIMS, Hubballi who gave consent to participate.

**Exclusion criteria:** Those students who were out of station or ill.

### Methods of data collection and tools used:

The study was conducted among the MBBS students of KIMS- Hubballi. The participants were briefed about the purpose of the study and informed written consent was taken and data was collected using semi-structured questionnaire.

Questionnaire consists of 3 main sections:

**Section A** - Social-demographic data such as age, gender, types of Family and per capita income.

**Section B** - Health related behaviours such as h/o tobacco, alcohol and drug abused, dietary habits like breakfast, consumption of fruits and vegetables, smart phone addiction which was assessed by using Smartphone addiction scale – Short form (SAS-SV).

SAS-SV consists of 10 items with a six-point Likert scale and a total score ranging from 10 to 60. Higher scores indicate more severe addictions. SAS was a relatively valid and reliable scale with Cronbach's alpha of 0.911 SAS-SV with Cronbach's alpha of 0.911 on a 6-point Likert-scale<sup>[19]</sup>.

**Section C** - Health related outcomes such as BMI and psychosocial problems which was assessed by using Strengths and Difficulties Questionnaire (SDQ)<sup>[20, 21]</sup>.

SDQ is a validated questionnaire which measures emotional problems, conduct problems, hyperactivity, peer problems, and pro-social behaviour, each composed of 5 items scored on a 3-point Likert-scale.

### Statistical analysis:

The data collected was entered in Microsoft Excel, it was double checked for any error and later analysed using SPSS 22 version software. Two- Step Cluster Analysis (TCA) with Log likelihood as distance measure and Akaike information criterion for clustering was used to identify groups of students with similar behaviour and health outcomes. The behavioural patterns together with socio-demographics age, gender, socio-economic status and health outcomes were used as the input variables.

### Results

**Table 1: Socio-demographic profiles**

	Variables	Percentage (%)
Gender	Male	70.7
	Female	29.3
Age	18-19	35.3
	20-21	53.0
	22-24	11.7
MBBS Phase	I	31.3
	II	34.7
	III	29.7
	IV	4.3
Type of family	Nuclear	84
	Joint	16
Socio-economic class	Upper class	68.3
	Upper middle class	16
	Middle class	10.3
	Lower middle class	3.7
	Lower class	1.7

The mean age of subjects was 20.05 years. 70.7% were males & 29.3% were females. 31.3% of participants were in 1st year, 34.7% in 2nd year, 29.7% in 3rd year and 4.3% in 4th year. Majority (84%) were from nuclear family and 68% belonged to Class I socio-economic status according to modified BG Prasad classification. (Table 1).

**Table 2: Health related behaviours**

Variables	Percentage (%)	
Use tobacco (Smoked or smokeless)	currently/ quit < 6 months	15.67
	Never/ quit > 6 months	84.33
Ever used any drugs like (cocaine, heroin, marijuana, weed)	Yes	5.33
	No	94.67
Drink alcohol in the last 4 months	Yes	11.33
	No	88.67
Break Fast/Week	≥5days	76
	< 5 Days	24
Vegetables /Week	≥5days	56.3
	< 5 Days	43.7
Fruits/ Week	≥5days	20
	< 5 Days	80
Physical Activity	Adequate (≥ 60 mins/day)	12
	Inadequate (60 mins/day)	88

It was found that 84.33% of the study population never used tobacco either in any form or quit >6 months back whereas 15.67% of them were currently using or quit < 6 months. 94.67% had never used drugs in any form. 11.33% had been taking alcohol in the last 4 months. 76% takes breakfast for ≥5 days/ week. 56.3% takes vegetables for ≥5days / week (amounting to roughly 300 grams daily). Only 20% takes fruits or fruit juices for ≥5days/week and majority of the subjects (88%) were found to have inadequate physical activity i.e. < 60 minutes physical activity /day for>5 days in a week in the form of running/jogging, swimming, cycling/walking (excluding going to college), fitness/ gym/ aerobic classes, dancing, any other activities that involve physical exercises (Table 2). The mean SAS-SV score was 32.77.

**Table 3: Clusters of health behaviours, health outcomes and demographics, formed by Two Step Cluster Analysis (N = 300)**

Clusters	Cluster 1	Cluster 2	Cluster 3	P- value
Size	13.7% (41)	42.7% (128)	43.7% (131)	
Demographic characteristics				
Gender	Male (100%)	Male (99.2%)	Female (66.4%)	0.000
Age	20.88	19.98	19.85	0.000
Family	Nuclear (73.2%)	Nuclear (100%)	Nuclear (71.8%)	0.000
Per capita family income (monthly)	10,275.68	20,558.93	12,940.98	0.012
<b>Health behaviours</b>				
Tobacco	Yes (85.4%)	No (91.4%)	No (99.2%)	0.000
Drugs	No (63.4%)	No (99.2%)	No (100%)	0.000
Alcohol	Yes (63.4%)	No (94.5%)	No (99.2%)	0.000
Breakfast/week	<5 days (78%)	≥ 5days (85.2%)	≥ 5 days (84%)	0.000
Vegetables/week	<5days (90.2%)	≥ 5 days (60.9%)	≥ 5days (66.4%)	0.000
Fruits/week	<5days (92.7%)	<5days (94.5%)	<5days (61.8%)	0.000
Physical activity	Inadequate (95.1%)	Inadequate (82.8%)	Inadequate (90.8%)	0.044
SAS total score	41.90	31.57	31.08	0.000
<b>Health outcomes</b>				
BMI (mean)	22.56	22.18	21.17	0.001
SDQ total score (mean)	20.44	13.94	13.83	0.000

**Two-step cluster analysis**

Three clusters were deducted from theTCA, details are presented in Table 4. Cluster -1 presented the high-risk cluster, cluster-2, moderate risk and cluster-3 represented the lowest risk or the healthiest cluster with the most positive scores in terms of both health-

related behaviours as well as health outcomes. Cluster-1 consists of 100% (41) male with undesirable scores all related behavioural patterns and higher mean SAS-SV higher SDQ score.

Cluster-2 consists of 99.2% male with highest socio-economic status with all participants belonging to

nuclear family. This cluster represents relatively healthy behaving individuals as compared to cluster-1 with regards to both health-related behaviours and outcomes. Cluster-3 represents the healthiest cluster, composed of mostly female (66.4%), with lower mean age as compared to the other two clusters. Cluster-3 contained the healthiest behavioural patterns with regards to sedentary habits and other behavioural factors (Table 4).

All the clusters show inadequate intake of fruits and inadequate physical activity. The differences observed in all the three clusters with different factors were found to be statistically significant ( $p < 0.05$ ).

## Discussion

This study was aimed to identify clustering of a comprehensive number of health-related behaviours among medical students of KIMS, Hubballi and to identify group of students with similar behaviour and health outcomes. The study formed 3 clusters namely 'high risk' cluster, 'moderate risk' and 'low risk or healthy' cluster. To our knowledge, the present study was among the first conducted to investigate clustering patterns of multiple health-related behaviours among young adults in India.

In the present study, 70.7% were males and 29.3% are females. Whereas in a study conducted by Vincent Busch et al, 45% were boys and 55% were girls<sup>[20]</sup>.

In the present study, 88.67% have never had alcohol and 84.33% have never used tobacco (smoked or smokeless), whereas in a study conducted by Conry MC et al 19% were non-drinkers and 52% have never smoked. The present study also showed that 9.6% of males and none of females had used drugs in any form whereas in a study conducted by Waris Qidwai et al, 85% of males and 15% of females have substance abuse<sup>[10]</sup>. In this study, 20.3 % and 11.3 % had vegetables and fruits for 5-6 days per week respectively, similar results were found in the study conducted by Giacomo Lazzeri et al where 16.9% had vegetables and 12.4% had fruits for 5-6 days per week<sup>[22]</sup>.

In this study, 19.3 % performed physical activity for 6-7 days per week, similarly in a study conducted by Giacomo Lazzeri et al 15.7% performed physical activity for 6-7 days per week [20].

In this study, the median SAS- SV score was 32, whereas in the study conducted by Zencirci SA et al, the median SAS-SV score was 26<sup>[23]</sup>.

After integrating these behavioural patterns together with several demographic factors and health related outcomes, 3 clusters of students were distinguished. Cluster-1 consists of 100% males with higher mean

age and lower socio-economic status, with unhealthy behaviour and outcomes. Cluster-2 composed of 99.2% males, all belonging to nuclear family with the highest socio-economic status, with good health behaviour and better health outcomes than cluster 1. Cluster-3 was dominant of females (66.4%), having the healthiest behaviour. In a study conducted by Vincent Busch et al on Clustering of health-related behaviours, health outcomes and demographics in Dutch adolescents, 4 clusters of adolescents were distinguished. Cluster-1 was dominantly healthy cluster, in which all behavioural patterns scores were relatively most healthy as well as their situation on health outcomes. Two other clusters (cluster 2 and 4) differed only slightly from healthy cluster. Cluster-3 showed strong clustering of both negative health related outcomes and unhealthy scores on all behavioural patterns, independent of demographic factors<sup>[20]</sup>.

## Conclusion

The study showed that health related behaviours such as substance abuse, dietary habits, physical activity, smart phone addiction and health related outcomes like psycho-social problems and BMI occurred in clusters. Healthier cluster reported lower levels of psychological distress and multiple risk factor clusters had highest levels of psychological distress. Most of the study population especially the male students form distinct clusters and most of them engage simultaneously in >1 unhealthy behaviour. This fact will undoubtedly contribute to compromising the health of the next generation. Therefore, interventions should target this group to tackle multiple health risk behaviour and, they should be made more aware about regular physical exercise and abstinence from alcohol and smoking, and increase intake of fruits and vegetables. Any intervention to improve the health behaviours should be done in groups of subjects with high risk and has to be directed towards multiple risk factors. Future research should also take a step further in this field in trying to understand the mechanisms that give rise to health behaviour clustering, together with their implications for interventions.

## Limitation

The study had some limitation. Firstly, the biochemical profile like blood sugar level and lipid profile were not done, only anthropometric measurements were taken. Secondly, health related behaviour and outcomes are influenced by academic stress, which was not assessed. Thirdly, health related behaviours such as substance abuse, dietary habits, physical activity, smart phone addiction requires proper assessment

which was not done here as the study was a cross-sectional study design.

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