

Comparative assessment of Knowledge, Attitude, Practice regarding sustainable development amongst Under Graduate and Post Graduate students of Dentistry in Pune city.

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Abstract: The UN has recommended 17 sustainable development goals (SDGs) which is to be attained by the countries around the world. They highlight the importance of good health and well being. The SDGs have been made easier to understand and practice by the common man in the form of “Lazy person’s guide”. A questionnaire was formulated by taking input from the guide to know about the practice, attitude and knowledge towards sustainable future. **Objective:** A comparative KAP survey was planned amongst the Under Graduate (UG) and Post Graduate (PG) students of Dental Colleges in Pune regarding sustainable development. **Materials and Method:** Two private dental colleges in Pune having 336 UG and 162 PG students were approached for the survey. The formulated questionnaire which covered 8 domains was validated and had good reliability. Data collection was done through the self administered questionnaire after briefing the students about the nature of the study. The responses to knowledge, attitude, practice was categorized dichotomously during analysis. **Results:** Knowledge regarding sustainable development seemed to be poor having less than 50% responses for most of the items. The UG and PG students had favorable attitude and their practice seemed to be good (>50%). **Discussion:** Majority of the female students in the age group of 20-27 years who responded need to have their knowledge boosted. Government of India(GOI) initiatives like protecting the girl child and educating, immunization program, cleanliness drive, encouraging use of solar energy and public transport, low cost lighting, encouraging corporate social responsibility will help spread awareness. This will definitely lead to a greener India, better place to live and a brighter future for all. **Conclusion:** Post graduate dental students showed better knowledge, attitude and practice than under graduate students though not significantly different. Within the limitations of the study, as the saying goes “Every cloud has a silver lining” ,though the knowledge about sustainable development is poor amongst the dental students, the attitude and practices are encouraging.

Keywords: Sustainable Development, Dentistry, Dental Students

I. INTRODUCTION

On 1 January 2016, the 17 Sustainable Development Goals of the 2030 Agenda for Sustainable Development -was adopted by world leaders in September 2015 at an historic UN summit - which officially came into force. They presented an unprecedented opportunity to bring the countries and citizens of world together to embark on a new path to improve the lives of people everywhere. Sustainable development has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.[1]

The new Goals are unique in that they call for action by all countries, poor, rich and middle-income to promote prosperity while protecting the planet. While the goals are not legally binding, governments are expected to take ownership and establish national frameworks for the achievement of the same. Countries have adopted new sustainable development agenda and global agreement on climate change. Conversely, action on climate change will drive sustainable development.[1]

The UN urges all to take action and tells what an average person can do to make an impact, by adopting super easy things into his routine that will make a big difference. Laziest person amongst us is part of the solution. We took cues from the Lazy person’s guide to saving the World developed by the UN [1]. Things can be done from your couch, from your home or from outside your home. Few of the many things that can make an impact were compiled.

In an earlier study [2], perception of sustainability and their awareness of the benefits for dental practices to go green were explored amongst dental students in University of Manchester. In another study Attitude on sustainable development through a Questionnaire study amongst school children was obtained in Ankara and they concluded that effective environmental education was necessary.[3] However, as per our literature search, no study has been undertaken amongst dental students to know from them as to how they could save the world using the

lazy person's guide provided by the UN. Hence, a comparative assessment of knowledge, attitude and practice on Sustainable Development amongst the Under Graduate and Post Graduate dental Students of Pune was undertaken to find out if any difference existed between them.

II. MATERIALS AND METHOD

Dental Curriculum in India is spread over 5 yrs of Under Graduation (UG) and 3 yrs of Post Graduation (PG) as specified by the Dental Council of India which recognizes 9 branches of Specialty. 4th BDS students, interns and postgraduate dental students having maximum exposure to clinics in the college of M A Rangoonwala Dental College and Sinhgad Dental College, Pune which were affiliated to Maharashtra University of Health Sciences were considered for this study. Sample size of 314 was calculated taking prevalence into consideration based on correct answer to one of the question under the opinion section of the questionnaire.[3]

Amongst 336 UG students enrolled for 4th BDS and Internship, every alternate student was selected for the present study in order to reduce the number of students and allow a meaningful comparison with postgraduate students who constituted to be 162 in number. Every second student when considered constitutes a total of 168 UG students; in case of absence of the student next roll number was being given a chance to participate. All 162 PG students were enrolled, as few were not available during data collection, 147 completed the survey. Those who were absent on the day of data collection, not willing to participate were excluded. Before commencing the study, approval was obtained from Institutional Review Board and Ethics Committee of Dr. D. Y. Patil University, Pune. Written informed consent was obtained. Nature of study with brief outline was explained to respondents.

A conceptual framework was prepared by identifying 8 domains to be included out of 17 SDGs. The questions were related to sustainable development and daily life, under which health, education, women empowerment, water and sanitation, energy, sustainable consumption and production, climate change, forests were considered. Knowledge and Practice section had multiple choice and, dichotomous questions whereas Attitude section had Likert scale. Face validity of the 24-item questionnaire was done by the Teaching Staff of Department of Public Health Dentistry. Some questions were modified and then marked as essential or non-essential based on the relevance, clarity and brevity of the questions by the subject matter experts. The minimum content validity ratio (CVR) for 10 subject matter experts was 0.62.[4] 5 questions which had less than minimum CVR were eliminated from the questionnaire leaving behind 19 questions. Ten participants took part in the test - retest reliability. Kappa statistics of .85 indicated good reliability of the questionnaire after which pilot testing was done amongst students.

The data along with demographic details was collected by the investigator through a self-administered questionnaire which

took 15 minutes for each respondent to fill. The participants were informed about the nature and aim of the study undertaken. Data collection was done by distributing the questionnaire to the students, interns and post graduate students in the Department where they were posted in both the colleges and to 4th BDS students it was distributed during their respective lecture.

Responses were coded for each question and then entered in the excel master chart. The responses for the knowledge section (Q1-6) of the questionnaire were categorized into good (correct answer) and poor. Favorable attitude was calculated after grouping agree and strongly agree, disagree and strongly disagree were grouped as unfavorable Attitude (Q7-11) except for Q No.12 which was reverse coded. Under the Practice section, correct responses were considered as good practice and incorrect response as poor practice (Q13-19). Statistical Package for Social Sciences (SPSS) version 19 software (SPSS inc., IBM, and Chicago, IL, USA) was used. Descriptive analysis in the form of number and percentage was calculated for each item.

III. RESULTS

23% of students wrongly felt both disposable and refillable bottle can save money. 17 % UG vs. 24 % PG students knew that light emitting diode bulb does not increase energy consumption while about 80 % of students were aware that light emitting bulb can either check carbon emission, reduce electricity bill, and could also be an energy efficient model. 44 % of students were of the opinion that disposable drape should be preferred, though it is not so. 30 % UG vs. 37 % PG students are not aware that garbage dump does not prevent landfills from growing. 67% of students are aware that any of the other answer which were choices given i.e. recycling paper, recycling plastic, recycling glass can prevent landfill from growing. 43% of the students thought that butane and propane, nitrogen and oxygen, argon and hexane are part of green house gas emission. 24 % UG vs. 25 % PG students answered all the three factors-measuring the climate foot print, reducing emissions as much as possible (restrict use of car) and Offsetting what you cannot reduce (Solar panel, Windmill) are essential for initiative towards climate neutrality. 75% of students felt that any of the above answer out of the options was correct. Students had poor knowledge regarding sustainable development with Postgraduate dental students reporting better scores and showing no significant difference between the groups when chi square test was applied (Table 1).

More than 80 % of students said solar panels can save energy, switching off electrical home appliances when not in use makes significant energy saving in the long term, using shopping list and avoiding unnecessary purchase of food that can spoil easily should be avoided, conversion of waste food into compost rather than throwing elsewhere can save the planet and that E-bill is preferable. When asked if a combination of vegetarian diet and non vegetarian diet was sustainable a rather small percentage of 8.3% UG vs. 12.9% PG students disagreed.

Post graduate and Under graduate dental students showed favorable attitude without any significant difference between them (Table-2).

More than 70% of respondents had good practice of donating or selling old products like books which were not in use, were in the habit of walking or cycling, carried a cloth bag from home while going shopping, repaired leaking tap at the earliest, felt vaccination protects oneself and can aid public health. 28%UG vs. 32% PG answered correctly that matchstick was preferred for lighting a gas burner. Around 71% of the students felt that either self lighter gas burner or electric lighter should be used. None of the respondents felt that plastic gas filled lighter should not be used. They did not think of renewable VS non renewable source of energy for one of the question while ticking the answer though they were briefed in advance. 31%UG vs. 22% PG shared post on social media.73% of the students either liked, liked and shared and a small percentage amongst these ignored the post. Less than 10% of the participants were not on social media. Practice of students seems to be good. No significant difference in practice was found between the UG and PG students (Table-3).

IV. DISCUSSION

A total of 15.24% males and 84.76% females in the age group of 20-27 years participated in the survey. This trend of higher female attendance is due to the fact that females are getting enrolled more in dental as well as medical courses in India now a days.

Although 70 % of students believed that use of refillable water bottle and coffee cup helps them in cutting down on waste and even save money. A question in Knowledge section confused the participants as it mentioned except, garbage dumps, Recycling paper, plastic, glass & aluminum keeps landfills from growing. Hence only 30-37% answered it rightly with 63 -70 % of students being unaware of the right answer. The authors feel that there is a need to reduce the carbon footprint which can be achieved by suggestions from college of Agriculture and Life Sciences; Texas by recycling half a household's waste, which will save 2,400 pounds of carbon dioxide per year. Buying products with minimal packaging helps reduce the total waste. For every 10% of waste reduction 1,200 pounds of CO₂ emission can be avoided [5]. On World Environment Day 2017, GOI launched the waste segregation campaign with the motive to reduce waste load from the landfills and have two-bin system, a nationwide policy for biodegradable and non-biodegradable waste.[6] Probably, such initiatives will attract the young students toward a positive change.

Energy-efficient lighting can make a considerable difference in overall electricity consumption and this has also been added in government of India initiatives. However, the dental students seemed to have poor knowledge about LED bulbs with 17-23% saying that LED bulbs increases energy consumption. Effectiveness of LED bulb is being understood best by statistics

published by Environmental Protection Agency which states that if every home in the U.S. replaced their 5 most used light bulbs with energy star bulbs the reduction in carbon emissions would be equivalent to removing 10 million cars from the road .[7] CO₂ emissions cause climate change, chemical pollution or depletion of natural resources, and thus it becomes necessary to go green.[8] Government of India (GOI) has provided subsidized LED bulbs so that the net power consumption rate comes down and environment is preserved through the Ujala Yojana Scheme [6] and hence solidarity is shown towards the Paris agreement. The government has launched the LED project, where the government is replacing the lighting load of the country with LEDs, which will reduce the carbon dioxide emissions to the tune of 80 million tonnes per annum and the economically prudent project will help the consumer save around Rs 40,000 crore in electricity bills annually. Poor knowledge amongst students is probably due to lack of awareness.

27% of 5th year dental students of University of Manchester [2] felt that they should switch to reusable or biodegradable dental consumable. Similarly, in the present study about 35-38% of the students felt that use of a cloth drape for the patient in the dental clinic would be a sustainable approach. If a machine is being used for washing see that the load is full and air dry the clothes. Washing clothes in cold water reduces carbon dioxide emission by 1.2-14.9 pounds per laundry load, depending on washing machine type; hot water temperature, and electricity source.[9]

A carbon foot print is a total green house gas emission caused directly or indirectly by an individual, organization, event or product. Throughout a products lifetime or lifecycle, different green house gases may be emitted such as methane and nitrous oxide, each with a greater or lesser ability to trap heat in the atmosphere.[10]54-61% dental students were having adequate knowledge that carbon dioxide and methane were the green house gas emissions. The UN's inventory accounts for six greenhouse gases (carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, per fluorocarbons and sulphur hexafluoride) and nine emission sources mainly covering emissions from travel and the use of energy and refrigerants.[11] Probably they are aware that introduction of cleaner/alternate fuel like CNG, LPG etc. and promotion of public transport network including Metro has reduced air pollution to an extent in India.

The United Nations climate change clean Development Mechanism suggested that Climate Neutral Now is an initiative towards climate neutrality through measuring, reducing and offsetting unavoidable emissions to ensure a better future for all. So it is necessary to limit global temperature rise to less than 2 degree Celsius.[12] In the present study only 24-25% of the students are aware about reducing global emissions. Some of the respondents are probably unaware that Conversion of India's vehicles to electrical vehicles has a potential to save fossil fuels.

It is a well accepted fact that Electricity bills can be reduced by having solar panels in the house. It was heartening to know that 87-90% of the students were aware of this. Solar photovoltaic (PV) systems produce electricity without emissions of air-polluting gases, greenhouse gases and particles that are byproducts of combustion or burning fuels. The supply of “fuel” for solar PV systems – sunlight and solar heat is endless and free. Solar energy can increase the property value, help produce your own power at home, may help value the opportunity to do your part to conserve energy and promote environmental quality by using an eco-friendly renewable energy resource.[13] India is trying to move from a highly thermal power generation dependent economy towards renewable energy. India will have 225 gigawatt of renewable and clean energy sources by 2022.[6]

87-89 % had the right attitude towards switching off electrical home appliances when not in use. Turn off your television, computer and other electronics when not in use to reduce your carbon foot print by thousands of pounds of carbon dioxide emission each year. Unplug unused electronics to further reduce your footprints.[5] Suggestion is that Television or the computer can illuminate the room and there may not be any reason why the other lights in the room should not be turned off.

88-90% of students found the need to shop smart and avoid impulse buys. Succumbing to marketing tricks and buying perishable items can turn out to be foolish as food may be discarded. The emissions associated with food production consist mainly of carbon dioxide (CO₂), methane, and nitrous oxide, which results primarily from agricultural practices. Hence, when one wisely shops one contributes towards reducing carbon footprints.[14] The food system process like raw material acquisition, processing, packaging, preservation, transportation, consumption, and disposal constitute a large part of greenhouse gases (GHGs) emissions. So there is a necessity to reduce carbon footprint within the life cycle of food system process. Rational site selection, environmental choices of packaging stage, reduction in refrigeration dependence and proper waste treatment, purchase pattern and substitution within the food product categories and carbon tax can play significant role in GHGs reduction.[15]

90-92% of the students felt that waste food should be composted and that it can reduce climate impact while also recycling nutrients and helping the plants grow better. With people’s wholehearted participation, “Swachha Bharat Abhiyaan” [6] by GOI has become a mass movement to make the nation clean and tidy. Waste management, including recycling of solid waste, reuse and hygienic disposal through scientific processes has gained momentum.

Eat less meat, poultry and fish. More resources are used to provide meat than plants.88-92%of the students felt that Veg and Non Veg diet is sustainable.However,Meat products have larger carbon footprints per calorie than grain or vegetable products because of the inefficient transformation of plant energy to animal energy.[14] Ruminant animals such as cattle,

sheep, and goats produced 164 million metric tons (mmt) in CO₂e of methane in the U.S. in 2014 through enteric fermentation(digestion).[16] Eating all locally grown food for one year could save the GHG equivalent of driving 1,000 miles, while eating a vegetarian meal one day a week could save the equivalent of driving 1,160 miles.[14] A vegetarian diet greatly reduces an individual’s carbon footprint, but switching between types of meat can have a major impact as well. For example, replacing all beef consumption with chicken for one year leads to an annual carbon footprint reduction of 882 pounds of carbon dioxide emission.[17] Organic food typically requires30-50% less energy during production but requires one third more hours of human labor compared to typical farming practices, making it more expensive.[18]

By donating 88-92% of students felt new life can be given to used clothes, furniture, books. They understood the importance of donation. They are aware that local charity like Goonz foundation, Sisters of charity etc, will be pleased by the donation.

28-32% of students used matchbox for lighting the gas burner. Renewable source of energy should be preferred over nonrenewable source of energy. Matchboxes are preferable as they don’t require any petroleum, unlike plastic gas-filled lighters.

For short distance travel, 86-87 % of students preferred cycling and walking. By taking some sustainable actions like walking, by using bike or switching to car-pool and driving the best in class vehicle we can reduce carbon foot print.[19] The average passenger car emits 0.81 pounds of CO₂ per mile driven.[20] It seems that on an average a regular sedan car driven 120,000 miles emits regularly 126,000 pounds of carbon dioxide gas emission from its engine and exhaust pipes.[21]

74-80% of the students believed that putting purchases in plastic bags instead of using reusable cloth bags is deleterious to the environment. These plastic bags would be discarded one day and it would remain in the soil without being degraded for thousands of years, without being beneficial to the environment. A good 99% of students believe in conservation of water.90-92% of students opted for E-bill as probably they felt that if paper is not being used they will be no forest destruction which in turn helps rainfall.

83-86 % of students felt that the practice of vaccination helps in maintaining public health. Sustainable systems for vaccinating children, adolescents, and adults must be developed in the context of a changing healthcare system. High immunization rates cannot rest upon one-time or short-term efforts. Greater understanding of strategies to increase and sustain immunization levels is necessary in order to create lasting, effective immunization delivery systems.[22]

‘Empowerment’ may be described as a process which helps people to assert their control over the factors which affect their lives. Empowerment of women means developing them as more aware individuals, who are politically active, economically

productive, independent and are able to make intelligent discussion in matters that affect them.[23] GOI has given special attention towards this by giving gas connections to more than 2 crore women, the maternity leave has been increased to 26 weeks, Rs. 6000 financial assistance is given for nourishment to pregnant women.[6]

V. LIMITATIONS

The study could have had some inherent limitations; few students who were approached to respond during clinical hours may not have fully concentrated on the questionnaire during answering as they were busy with their clinical work. Responses to questions in the practice domain may have been favorable as they felt they were probably being judged.

VI. CONCLUSION

Though significant difference between the UG and PG students where KAP regarding sustainable development was not found, we noticed favorable attitude and good practice amongst the students. This study will make the students think over their daily practices and attitude which will help them bring about necessary changes in their lifestyle that will sustain their future. The link to Lazy person's guide by UN was forwarded to all the respondents via e-mail after analyzing the data.

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Table 1-Correct responses towards knowledge regarding sustainable development among dental students.

Q.No	Questions	Undergraduate n=168,%	Post-Graduate n=147,%
1	You can cut down the waste and save money using.....	(120)71.4%	(106)72.1%
2	Which option about Light Emitting Diode (LED) bulb is false?	(29)17.2%	(36)23.8%
3	Drape preferred by the dentist for the patient in the clinic is?	(59)35.1%	(57)38.7%
4	Following prevents landfills from growing, except.....	(50)29.7%	(55)37.4%
5	Green house gas emissions are, except.....	(91)54.1%	(90)61.2%
6	Climate Neutral Now is an initiative towards neutrality through.....	(41)24.4%	(37)25.1%

50% and above response considered Good Knowledge.

Table 2-Favorable responses towards attitude regarding sustainable development amongst UG and PG dental students

Q.No	Questions	Undergraduate n=168,%	Post-Graduate n=147,%
7	Solar panels can help save energy.	(147)87.5%	(133)90.47%
8	Switching off electrical home appliances helps in significant energy savings.	(147)87.5%	(132)89.7%
9	Using shopping list and avoiding unnecessary purchase can change the world.	(148)88.0%	(132)89.7%
10	Waste food should be converted into compost rather than throwing.	(152)90.4%	(135)91.8%

11	E-Bill rather than paper bill helps protect the environment.	(152)90.4%	(135)91.8%%
12	A combination of Vegetarian and Non-vegetarian diet is sustainable.	(14)8.3%	(19)12.9%

50% and above response considered Favorable attitude.

Table3- -Good practice towards sustainable development among dental students.

Q.No	Questions	Undergraduate n=168,%	Post-Graduate n=147,%
13	What do you do with your old products like Books?	(147)87.5%	(135)91.8%
14	Lighting a gas burner using...	(47)27.9%	(47)31.9%
15	For short distance travel, I prefer ...	(144)85.7%	(128)87.0%
16	Anu was given a plastic bag by shopkeeper. What should Anu do in this situation?	(124)73.8%	(117)79.5%
17	If the tap is leaking, I get it.....	(166)98.8%	(145)98.6%
18	Protecting yourself through vaccination can aid public health	(144)85.7%	(122)82.9%
19	Post on women empowerment on social media should be.....	(52)30.9%	(33)22.4%

50% and above response considered Good Practice.

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