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**Original Research Article**

# Utilization of E-Devices and Internet among Medical Students in a private medical college in central Kerala, India

Rajiv K. Singh[1], Christy G. Kulathinal[2], Darshana D. Sadasivan[2], Devi Balasubramaniyam[2], Devi Prasannakumar[2], Divya Thankachan[2]

**Date of Submission: 14.11.2014** **Date of Acceptance: 15.12.2014**

**Abstract**

**Background:** Most of the medical students are using e-Devices. This study was conducted to find the nature, impact, whether beneficial or adverse, the e-Devices are having on student's academics, physical and mental health and, is making their life convenient or harming them. **Material and Methods:** Cross-sectional study was conducted in a private medical college in central Kerala and proportions, test of significance like Chi square, t test was used. Objectives: To find the prevalence and pattern of utilization of electronic devices; to evaluate the pattern, purpose of internet usage and factors influencing it; and to assess the need for incorporating computer education in medical curriculum. **Results:** 350 students participated in the research.90(25.7%) of students don't spend money to get access to internet. 255(79.45%) spend 2 hours or less on the internet. 296(84.6%) of students use internet for academic purposes. 152(43.4%) felt that e-Devices made their academic performance better while 40(11.4%) of the students felt it to be worse. 88(25.1%) prefer reading e books over conventional textbooks. 213(60.9%) do not have any problem while using internet but 96(27.4%) students had problems of eye strain while using internet. **Conclusions:** Most students seem to be able to balance the e-Device used and use it for academic purpose and making their lives efficient. But few got their academic performance worse, and some are suffering from eye strain, so efficient management of time on e-devices and internet without hindering their academic performance is needed.

**Key words:** e-Devices, Internet, Medical Students, Computer.

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## Introduction

The use of computer and information technology is on an escalation. The internet, one of the key developments in this field, provides instant access to latest medical information.[1] Computer assisted management of medical information has also increased. The evolving nature of medical knowledge and technology requires that medical practitioners develop computer skills to enhance the quality of patient care and for ongoing education and research.[2] There was an urgent need to do this study on medical students. Medical students are spending increasing amount of their time on



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electronic devices like laptops, smart phones, tablets, Personal Computers, etc. So this study was done to examine this issue in detail to see how this time can be channelized to meet their education goals, to improve their efficiency, productivity and also to make sure it does not hamper their education, moral, psychological, physical health and safety.

We did not include the issue of e-waste in this study as in our opinion very little e-waste is being generated by medical colleges and hospitals in India.

**Aims and Objectives**

Objectives of the study are to gather data from the students of a medical college to-

1. Find the prevalence and pattern of utilization of electronic devices,
2. Evaluate the pattern, purpose of internet usage and factors influencing it,
3. Assess the need for incorporating computer education in medical curriculum.

**Material and Methods**

Cross-sectional study was conducted November 2014 in a Private medical college in Central Kerala, India. All medical students were included in the study. Consent was obtained from the students by disclosing that the data collected is for research purpose, that the pretested questionnaire is anonymous and their participation in the study is voluntary.

For convenience, in our study following criteria was given and defined for family income, i.e. >Rs 6 lakhs /year as Upper Income and < or equal to Rs 6 lakhs/year income as Lower Income Family, as we did not want to make multiple small groups based on per capita income or above and below poverty line.

The collected data was tabulated and analyzed using MS Excel and Epi Info 7 and for significance by various tests of significance like $\chi^2$ and t-test.

**Results**

Demography: 350 students 261(74.6%) were females and 89(25.4%) were males; religion wise Christians were 78(22.3%), Hindus 222(63.4%) and Muslims 50(14.3%); 186(53.1%) of students were from rural area and 164(46.9%) from urban area; 32(9.1%) were day scholars and 318(90.9%) lived in the hostel; 241(61.1%) were from families with income less than or equal to Rs. 6 lakhs per year, and 136(38.6%) were from families with income of more than Rs. 6 lakhs per year. Mean age of the students was 20.48 years (range 17-24 years).

Table 1 shows the increasing trend of utilization of mobile phones among all e-devices and usage and ownership of smart phones is also high. Even though more than half the students own a laptop, only a quarter use it regularly; and the tablet PC has captured 12% of students.



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**Table 1: Use of E-devices (N=350)**

| Device | Ever Used | Regularly Used | Devices Owned |
|---|---|---|---|
| **Mobile Phone** | 255(72.9%) | 223(63.7%) | **240(68.6%)** |
| **Smart Phone** | 166(47.4%) | 155(44.3%) | **163(46.6%)** |
| **Lap Top** | 226(64.6%) | 89(25.4%) | **178(50.9%)** |
| **Tablet** | 52(14.9%) | 15(4.3%) | 42(12.0%) |
| **iPod** | 80(22.9%) | 35(10%) | 76(21.7%) |

Students spent an average of 3.44 hours per day on e-devices Standard Deviation (SD) 4.42 hours. Out of the 256(73.14%) students who paid the recurring monthly cost for e-devices from their own pocket money, monthly average was Rs. 217.24 per month, SD Rs. 244.35 per month.

Out of 350 students who responded, mean time spent daily on internet is 1.83 hours per day (SD 2.98 hours per day). Students spent on an average Rs. 87.14 on getting access to internet monthly (SD Rs. 174.10 per month).

Thirty five (10%) students did not spend any time on e-devices in a day. Eighty four (24%) did not spend any time on internet in a day. Ninety (25.7%) do not spend any money to get access to the internet. Two hundred and fifty five (79.4%) spend 2 hours or less on internet and 91(26%) did not know how much money they spent on the internet as their parents paid the bill directly. Only 2 students (0.6%) are connected to internet 24 hours a day.

Most results are given in tabulated form and are self-explanatory, but the results with significant

**Table 4: Physical Problems while using e-devices**

| Nature of the Problem | Frequency (N=350) |
|---|---|
| Pain in the back | 17(4.9%) |
| Pain in the Hands | 23(6.6%) |
| Pain in the Neck | 30(8.6%) |
| Headache | **68(19.4%)** |
| Eye Strain | **95(27.1%)** |
| No Physical Complaints | **214(61.1%)** |

**Table 6: Place of Internet Access**

| Place of Access | Frequency (N=350) |
|---|---|
| Netsetter | 48(13.7%) |
| Library Free Access | 50(14.3%) |
| Smart Phone Internet Access | 132(37.7%) |
| Home – Family Connection | 148(42.3%) |
| Mobile Phone Internet Access | 157(44.9%) |

**Table 7: Pattern & Purpose of Internet Use**

| Purpose of Access | Ever Used | Regularly Use |
|---|---|---|
| Keep in touch with Friends & Family | 294(84.0%) | 257(**73.4%**) |
| Download music, films & games | 278(79.4%) | 199(**56.9%**) |
| Academic Purpose | 297(84.9%) | 219(**62.6%**) |
| Online Banking | 52(14.9%) | 38(10.9%) |
| News & Gossip Reading | 116(33.1%) | 78(**22.3%**) |
| Technical Support | 73(20.9%) | 45(12.9%) |
| Online Shopping | 86(24.6%) | 50(14.3%) |
| Online Games | 68(19.4%) | 42(12%) |
| View Pornography | 32(9.1%) | 20(5.7%) |
| Video chatting/Video conference with Webcam | 65(18.6%) | 39(11.1%) |



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differences have been highlighted for reader's convenience.

On doing further t-test on 95(27.1%) students who complained of eye strain as compared to 254(72.8%) who did not have eye strain, we found that those with complains of eye strain were spending an average of 4.76 hours per day on e-devices, as compared to an average of 2.94 hours on e-devices per day by those who did not complain of eye strain, a mean difference of 1.817 hours per day, t=2.650, and P=0.009. Thus there was a significant difference on number of hours spent on e-devices and complain of eye strain.

Even though those with complain of eye strain spent a mean of 0.347 hours more on internet per day, the difference was not significantly associated with complain of eye strain (t=.969, P=.333).

We further looked into the second highest complain of headache reported by 68(19.4%) students. We found that those complaining of headache were spending an average of 1.158 and 0.520 hours more on e-devices and internet per day, respectively; but this was not significantly associated with daily use of e-devices (t=1.945, P=0.053) and daily use of internet (t=1.292, P=0.197).

Other complains of pain in the neck, back and hands were reported by less than 10% of students and were not significantly associated with number of hours of daily use of e-devices and daily use of internet, as per this study.

One hundred and thirteen (32.3%) students do not spend any time every day on the internet. Nineteen (5.4%) gave real phone number, 28(8%) gave real email id, 11(3.1%) gave real address, 22(6.3%) gave real photograph, 50(14.3%) gave real name to strangers online, Two hundred nineteen (82.9%) have not given any of their details to strangers online.

Out of total students, 110(31.4%) were online for railway ticket reservation, 55(15.75%) for banking, 50(14.3%) for net banking, 45(12.9%) for air ticket reservation, 36(10.3%) for bus ticket reservation, 32(9.1%) for holiday package reservation, 22(6.3%) for hotel reservation, 4(1.1%) for car reservation, and 152(43.1%) had not been online for any of these purposes.

Two hundred and fourteen (61.1%) preferred internet because it saved time, 233(66.6%) because it gave latest information, 138(39.4%) felt it was more useful, 84(24%) because it was less expensive and 92(26.3%) felt it was a more preferred medium.

Two hundred and nineteen (62.6%) had no problems in using the internet, 40(11.4%) were not able to use internet as they lacked time, 3(0.9%) due to inadequate computer education, 22(6.3%) due to lack of accessibility, 31(8.9%) lack of interest, 29(8.3%) because it is expensive, only 2(0.6%) felt it lacked privacy, and 3(0.9%) considered it as insecure.

Forty five (12.9%) would like to have some computer and internet classes.



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**Table 2: Resource Utilization by Urban and Rural Students**

| Variable | Residence | N | Mean | Mean Difference | t | p value |
|---|---|---|---|---|---|---|
| Hours / day on e-Devices | Rural | 186 | 2.69 | **-1.589** | -3.285 | .001 |
| | Urban | 163 | 4.28 | | | |
| Money./ month on e-devices | Rural | 137 | 185.39 | **-68.513** | -2.255 | .025 |
| | Urban | 119 | 253.91 | | | |
| Money./ month on internet | Rural | 142 | 80.68 | **-40.120** | -2.383 | .018 |
| | Urban | 117 | 120.80 | | | |
| Hours / day on internet | Rural | 186 | 1.54 | -0.62 | -1.936 | .054 (*Not Significant*) |
| | Urban | 164 | 2.16 | | | |

**Table 3: Resource Utilization and Family Income**

| Variable | Family Income(lakhs/year) | N | Mean | Mean Difference | t | p value |
|---|---|---|---|---|---|---|
| Hours / day on e-Devices | Less than equal to 6 | 213 | 2.94 | **-1.274** | -2.342 | .020 |
| | More than 6 | 136 | 4.21 | | | |
| Money./ month on e-devices | Less than equal to 6 | 159 | 190.94 | -69.424 | -2.081 | 0.039 |
| | More than 6 | 97 | 260.36 | | | |
| Money./ month on internet | Less than equal to 6 | 163 | 79.60 | **-51.815** | -2.668 | .009 |
| | More than 6 | 96 | 131.42 | | | |
| Hours / day on internet | Less than equal to 6 | 214 | 1.37 | **-1.178** | -3.200 | .002 |
| | More than 6 | 136 | 2.55 | | | |

**Table 5: Resource utilization and Eye Strain**

| Variable | Eye strain | N | Mean | Mean Difference | t | p value |
|---|---|---|---|---|---|---|
| Hours / day on e-Devices | Yes | 95(27.1%) | 4.76 | **1.817** | **2.65** | **.009** |
| | No | 254(72.8%) | 2.94 | | | |
| Money./ month on e-devices | Yes | 68 | 199.10 | -24.700 | -0.714 | .476(NS) |
| | No | 188 | 223.80 | | | |
| Money./ month on internet | Yes | 67 | 102.36 | 3.442 | 0.178 | .859(NS) |
| | No | 192 | 97.92 | | | |
| Hours / day on internet | Yes | 95 | 2.08 | 0.347 | 0.969 | .333(NS) |
| | No | 255 | 1.74 | | | |



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**Table 8: Significant Differences among sexes for e-devices use**

| Device | Males (%) | Females (%) | $X^2$ | p value |
|---|---|---|---|---|
| Ever Used Smart Phones | 64(71.9) | 102(39.1) | 28.688 | 0.000 |
| Ever Used Laptops | 68(76.4) | 158(60.5) | 7.305 | 0.007 |
| Ever Used Tablet | 21(23.6) | 31(11.9) | 7.204 | 0.007 |
| Ever Used iPod | 31(34.8) | 49(18.8) | 9.705 | 0.002 |
| Daily use Mobile Phones | 45(50.6) | **178(68.2)** | 8.930 | 0.003 |
| Daily use Smart Phones | 60(67.4) | 95(36.4) | 25.879 | 0.000 |
| Daily use Laptop | 30(33.7) | 59(22.6) | 4.314 | 0.038 |
| Daily Use iPod | 16(18) | 19(7.3) | 8.439 | 0.004 |
| Ownership Mobile Phone | 53(59.6) | **187(71.6)** | 4.507 | 0.034 |
| Ownership Smart Phone | 61(68.5) | 102(39.1) | 23.147 | 0.000 |
| Ownership iPod | 27(30.3) | 49(18.8) | 5.220 | 0.022 |
| Internet on Smart Phone | 49(55.1) | 83(31.8) | 15.28 | 0.000 |

*Degree of Freedom =1, n=350*

**Table 9: Utilization of e-devices by urban and rural students**

| Device | Urban (%) | Rural (%) | $\chi_2$ | p value |
|---|---|---|---|---|
| Mobile Phone Ever Used | 107(65.2) | **148(79.6)** | 9.045 | 0.003 |
| Smart Phone Ever Used | **88(53.7)** | 78(42.9) | 4.804 | 0.028 |
| Laptop Ever Used | 117(71.3) | 109(58.6) | 6.183 | 0.013 |
| Daily use Mobile Phone | 92(56.1) | **131(70.4)** | 7.744 | 0.005 |
| Daily use Smart Phone | **83(50.6)** | 72(38.7) | 5.002 | 0.025 |
| Own Mobile Phone | 101(61.6) | 139(74.7) | 6.989 | 0.008 |
| Own Smart Phone | 89(54.3) | 74(39.8) | 7.347 | 0.007 |
| Own Tablet Computer | 26(15.9) | 16(8.6) | 4.340 | 0.037 |

*Degree of Freedom = 1, n=350*

Eighty eight (25.1%) preferred reading e-books than conventional textbooks. One hundred fifty two (43.4%) felt that e-device usage made their academic performance better and 40(11.4%) felt it became worse while 154(44%) felt it had no effect on their academic performance. So in total 55.4% felt it had no effect on their academic performance or made it worse.

Cross Tabulations: Junior students had significantly lower experience in laptop use as



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**Table 10: Difference in online behavior among Male & Female Students.**

| Behavior | Males (%) | Females (%) | $\chi^2$ | p value |
|---|---|---|---|---|
| Gave Phone Number to Stranger | 14(**15.7**) | 5(1.9) | 24.671 | 0.000 |
| Gave Email to Stranger | 21(**23.6**) | 7(2.7) | 39.440 | 0.000 |
| Gave Address to Strangers | **10(11.2)** | 1(0.4) | 25.680 | 0.000 |
| Gave Photograph to Strangers | 15(**16.9**) | 7(2.7) | 22.629 | 0.000 |
| Gave Name to Strangers | 28(**31.5**) | 22(8.4) | 28.751 | 0.000 |
| Not Given any info to Strangers | 58(65.2) | 232(**88.9**) | 26.290 | 0.000 |
| Ever for Contacting Friend | 83(**93.3**) | 211(80.8) | 7.612 | 0.006 |
| Ever for Banking | 26(**29.2**) | 26(10) | 19.446 | 0.000 |
| Ever for News | 51(**57.3**) | 65(24.9) | 31.441 | 0.000 |
| Ever for Technical Support | 41(**46.1**) | 32(12.3) | 45.952 | 0.000 |
| Ever for Shopping Online | 38(**42.7**) | 48(18.4) | 21.155 | 0.000 |
| Ever for Online Gaming | 30(**33.7**) | 38(14.6) | 15.546 | 0.000 |
| Ever for Online Pornography | 31(**34.8**) | 1(0.4) | 94.811 | 0.000 |
| Ever for Online Video Chat | 30(**33.7**) | 35(13.4) | 18.082 | 0.000 |
| Ever Online for Rail Ticket | 44(**49.4**) | 66(25.3) | 17.962 | 0.000 |
| Ever Online for Bus Ticket | 18(**20.2**) | 18(6.9) | 12.776 | 0.000 |
| Ever Online for Holiday Pack | 13(**14.6**) | 19(7.3) | 4.289 | 0.038 |
| Do not go Online Regularly | 6(6.7) | 39(**14.9**) | 3.984 | 0.046 |
| Regularly Contact Friend | 73(**82.0**) | 184(70.5) | 4.518 | 0.034 |
| Regularly Banking | 20(**22.5**) | 18(6.9) | 16.636 | 0.000 |
| Regularly for News | 37(**41.6**) | 41(15.7) | 25.635 | 0.000 |
| Regularly Technical Support | 27(**30.3**) | 18(6.9) | 32.584 | 0.000 |
| Regularly for Shopping online | 23(**25.8**) | 27(10.3) | 13.018 | 0.000 |
| Regularly for Online Game | 21(**23.6**) | 21(8.0) | 15.196 | 0.000 |
| Regularly for Online Porno. | 20(**22.5**) | 0(0.0) | 62.206 | 0.000 |
| Regularly Online Video Chat | 19(**21.3**) | 20(7.7) | 12.554 | 0.000 |
| Prefer Reading eBooks | 30(**33.7**) | 58(22.2) | 4.652 | 0.031 |

*n=350, Degree of Freedom 1, higher percentage has been marked in **bold**.*



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**Table 11: Resource utilization and Regular Social Networking**

| Variable | Regular social Networking | N | Mean | Mean Difference | t | p value |
|---|---|---|---|---|---|---|
| Hours / day on e-Devices | Yes | 256(**73.35%**) | 3.81 | **1.4 hours** | 3.433 | .001 |
| | No | 93(**26.64%**) | 2.41 | | | |
| Money./ month on e-devices | Yes | 183 | 236.09 | **Rs. 66.09** | 1.965 | 0.51(NS) |
| | No | 73 | 170.00 | | | |
| Money./ month on internet | Yes | 180 | 124.48 | **Rs. 84.18** | 4.774 | 0.000 |
| | No | 79 | 40.30 | | | |
| Hours / day on internet | Yes | 257(**73.43%**) | 2.13 | **1.13 hours** | 3.181 | 0.002 |
| | No | 93(**26.57%**) | 1.00 | | | |

**Table 12: Resource utilization and Regular Downloading**

| Variable | Regular downloading | N | Mean | Mean Difference | t | p value |
|---|---|---|---|---|---|---|
| Hours / day on e-Devices | Yes | 199 | **4.36** | **2.155** | 4.639 | .000 |
| | No | 150 | 2.21 | | | |
| Money./ month on e-devices | Yes | 145 | 249.59 | 74.595 | 2.444 | .015 |
| | No | 111 | 174.99 | | | |
| Money./ month on internet | Yes | 146 | 138.24 | 90.381 | 5.606 | .000 |
| | No | 113 | 47.86 | | | |
| Hours / day on internet | Yes | 199 | **2.55** | **1.672** | 5.405 | .000 |
| | No | 151 | 0.88 | | | |



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**Table 13: Resource utilization and Regular Use for Academics**

| Variable | Regular Use for Academics | N | Mean | Mean Difference | t | p value |
|---|---|---|---|---|---|---|
| Hours / day on e-Devices | Yes | 218 | 3.98 | **1.443** | 2.985 | .003 |
| | No | 131 | 2.53 | | | |
| Money./ month on e-devices | Yes | 159 | 230.31 | 34.483 | 1.096 | .274(NS) |
| | No | 97 | 195.82 | | | |
| Money./ month on internet | Yes | 154 | 123.16 | 60.077 | 3.567 | .000 |
| | No | 105 | 63.09 | | | |
| Hours / day on internet | Yes | 219 | 2.08 | **0.670** | 2.045 | .042 |

compared to seniors ($\chi^2$ 57.794, p=0.000). They also had a significantly lower ownership of laptops ($\chi^2$18.389, p=0.001). Older students had significantly more laptop experience ($\chi^2$35.497, p=0.000).

Religion had no significant difference in the use of mobile phone, smart phone, laptop, and tablet computer.

Table 9 shows the utilization of e-devices by urban and rural students. The urban students who have ever used and owned mobile phones were proportionately less than rural students. But the prevalence of utilization and ownership of smart phones and laptops are higher among urban students. Urban students use smart phone daily more than rural students while it is vice versa for mobile phones.

In table 10, it can be seen that female students are following male students, many times closely, in online behavior; but the girls are much wiser than boys in not giving personal information to the strangers online, and more girls do not go online regularly without any work.

Religion wise significant differences- Only 54(69.2%) Christians and 37(74.0%) Muslim students ever downloaded anything from internet as compared to 187(84.2%) Hindu students ($\chi^2$ 9.004, DF 2, p=0.011). Similarly using the internet ever for banking was only 3(6.0%) among Muslims, 8(10.3%) among Christians as compared to 41(18.5%) among Hindus.

There was no significant difference religion wise in physical discomfort, place of access of internet, hours of internet use per day, money spend for internet, giving personal information over the internet, using internet for social networking, using internet for academic purposes, using internet for news and gossips.



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## Discussion

### Prevalence and Pattern of Utilization of Electronic Devices

With the advancement in modern technology and over all development the role of E-devices in medical education has also increased. Our studies shows that 68.6% own mobile phones, 46.6% own smart phones, 50.9% own lap tops and 63.7%, 44.3% and 25.4% regularly use mobile phones, smart phones and laptops, respectively. But the computer use is fairly higher in other studies, as in study done by Lal et al (81.6%), Inamdar et al (84.5%).[2, 4] This is because of increased application, mainly of internet, in mobile phones, smart phones and tablets (Tablet Computers) in the present modern times.

Table 3 shows that even though the students from richer family background, in our study from families with income more than 6 lakhs per year, do not spend too much money more than those students who come from lower income families but they do spend valuable time from daily study time, of 1.274 hours and 1.178 hours of time more per day on e-devices and internet use as compared to students from lower income group families. This type of daily waste of time adds up and may reflects on academic performance. Further studies need to be done that correlate or cross tabulate the academic performance with daily time spent on e-device and internet, to find out if the students from higher income families are throwing little money and lot of time from their academic time. Students from higher income families need to understand that just because you are from a higher income family background does not mean that you should throw away your time on wasteful activities of addiction of new technology, so as to loose daily study time.

### Pattern, Purpose of Internet Usage and Factors Influencing It

Use of the internet is a part of college student's daily routine. It has been integrated into their daily communication habits and become a technology as ordinary as telephone or television. When compared to the study done by Unnikrishnan et al 69.5% undergraduates used internet for entertainment whereas in our study it was 56.9% and a difference of 20% was found in use for academic purposes.[7]

A student has to attend classes for eight hours and needs good sleep of eight hours, taking another two hours for lunch, dinner, breakfast and bath etc. a total of 18 hours are busy hours. This leaves only five to six hours in a 24 hour day to study**.** For our calculation we are taking the daily study time to be six hours. Table 11 clearly shows the 256(73.35%) students who did regular social networking spent on an average 1.4 hours (**23.3% of study time)** more per day on e-devices. The 257(73.43%) students who did social networking, spent on an average 1.13 hours (**18.83% of study time**) more per day on internet. Those who did social networking regularly as compared to those who did not, the time spent, which comes from study



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time (almost 42.12% of their average study time daily) is a lot.

Average time spent for internet usage by the students in our study is 1.81 hours per day whereas from other studies done by Unnikrishnan et al and Maroof et al, it was found to be less than three (3) hours per week.[7, 6] From their study about 34.5% students prefer textbooks than internet whereas 25.1% of students in our study prefer e-books.

According to our study students (66.6%) preferred internet as it provides latest information and this was high when compared to the above study which gave a result of 58.1%.

Based on the study done by Kochhar et al students had problems in using internet due to lack of time (51.43%), lack of interest (5.71%), cost of accessing (20%), and privacy (<50%) while ours were 11.4%, 8.9%, 8.3%, 0.6%, respectively. [8] The data obtained indicates that majority of the medical students participated in the study embrace and use internet for entertainment.

While looking at the figures from table 4, in the context of medical students we have to take in account that medical students are supposed to study a lot and understand a lot of different complex subjects and ideas during their medical education. This regular medical study, the primary purpose of coming to medical college, also requires work that is a strain on the eyes and can give headache, complain that was found in 27.1% and 19.4% of students. T-test clearly showed (Table 5) that hours spent on e-devices was significantly associated with complain of eye strain. Medical students need to make a choice of more mature behavior with e-device use and those who have eye strain, need to reduce the number of hours they spend on e-devices per day, this is likely to benefit them and reduce their complain of eye strain.

Students need to be more careful about their privacy and security and should not give their real information to strangers online.

Table 8 shows that a gender difference seen as males chasing more latest and new technology.

Table 10 shows that female students in this college are more conservative in their online behavior. Though Table 7 showed 20(5.7%) students were going online for pornography regularly, looking at closely clearly tells us that 20(22.5%) of male students are going online regularly for viewing pornography. Lal et al in Maulana Azad Medical College (MAMC) in 2005 showed that only 1.8% of undergraduates and no postgraduates were going online for viewing pornography.[2] The figure in our study may be higher due to the fact that our survey was anonymous, and in MAMC study methodology, anonymity has not been mentioned. Another reason for higher findings could be better internet facility with broadband, etc. now in 2014 as compared to time of MAMC study in 2005.



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**Need for Incorporating Computer Education in Medical Curriculum**

In our study the number of students willing to undergo training is 12.9%. This when compared to study by Inamdar et al in the year 2004 is quite low which gave result that 82.8 % students were willing to undergo training.[4] In our study only Forty five (12.9%) would like to have some computer and internet classes and 3(0.9%) said that they have inadequate computer education. This is probably due to the fact that we are a new generation of students who have been working on computers and e-devices since lower kindergarten class.

Undergraduate students need to use the internet for preparing for seminars and projects. Besides that they do other e-device and internet activity mainly for entertainment and social networking.

**Conclusions & Recommendations**

E-devices have penetrated the student population of this college and their ownership and usage is universal. Only one student did not own a mobile phone. Students are now migrating from wired internet to wireless devices that provide internet, like mobile and smart phones, wireless Netsetter, etc. and are not dependent on partially blocked free internet being provided by the college. Library internet cannot be used to access entertainment, downloading, or other adult sites. So, especially for entertainment (movies and music) and e-book download, students need to have their own internet connection. Once downloaded students share these files quite freely in the college.

Some students are spending a lot of time on the internet and e-devices and some of those are suffering from eye strain. They need, as a mature and grown up adult, to make a choice to reduce the time they are spending on e-devices to come back to positive health.

The internet was used regularly by the medical students in social networking (73.4%), entertainment (56.9%), and academic purpose (62.6%). Entertainment and social networking is important for morale and happiness, and e-devices are useful. But 11.4% of the students felt that the academic performance became worse with e Device usage. Hence proper planning and utilization of e-devices are needed.

Some students are giving their personal information to strangers online, this has to be avoided for the reasons of privacy and security.

Compared to ten (10) years ago, the use of e-devices has become an epidemic, and all colleges need to put a control on it by educating against overuse of e-devices.

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**Original Research Article**

# Smokeless Tobacco (Mishery) Use among Adolescent Girls- a Neglected Entity

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**Abstract**

**Background:** In India there is wide spread misconception that, tobacco is good for teeth,so prevalence of application of tobacco products as dentrifice is commonly seen.**Objectives:** 1.To assess the prevalence of mishri use in adolescent girls of community adopted under UHTC,Karad.2.To study the factors associated with and implications of mishri use on nutritional status of adolescent girls.**Materials and Methods:** A cross sectional study was carried out in the population covered by the Urban Health Training Centre, Department of Community Medicine, K.I.M.S., Karad, Maharashtra, India. All adolescent girls in the age group of 10 to 19 years were interviewed by house to house survey. The data was collected using pretested structured proforma.Dietary intake was assessed using 24 hour recall method.Haemoglobin was estimated by Sahli's haemoglobinometer and statistical analysis was undertaken using SPSS 16 software.**Results:** Significantly higher proportion (83.8%)of mishri users were in late adolescence. Mishri use in mothers was associated with mishri use in daughters($x2=3.73$ ,$d.f.=1$,$p<0.053$).Majority of adolescents using Mishri were non enrolled in the school or were school dropouts.All mishri users had mild to moderate anemia.No significant difference was observed in mean height,weight,BMI as well as intake of calorie,protein and iron intake among users and non users of mishri**Conclusion:**Mishri use was more in late adolescent age group, in those who were not enrolled in school,among school drop outs and whose mothers were mishri users. Use of mishri was not found to have effect on the dietary intake and growth. However moderate anemia was more.

**Key words:** Mishri use,BMI,Dietary intake,anemia

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## Introduction

Adolescence has been defined by World Health organization as period of life spanning the ages between 10 to 19 years.[1] Today approximately $1/5^{th}$ of world's population is constituted by adolescents out of whom more than $4/5^{th}$ reside in developing countries.[2] Adolescents represent 22.8% of the population of India. [3] Adolescence is a transitional period between childhood and adulthood in which many interrelated physical, social and psychological changes take place.[4] Healthy development of adolescents is dependent on several complex factors, their socioeconomic circumstances, the social environment in which they live and grow



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quality of their relationship with their families, communities and peer group as well as opportunities for education and employment.[3] Attributes of adolescence are rapid but uneven physical growth and development, sexual maturity, desire for experimentation, development of adult mental processes, self identification and transition from dependence to relative independence. [3] Multiple health problems are associated with specific type of behaviour pattern, of which tobacco use in different forms is commonly observed among adolescents. In countries of South Asia, traditional values do not favour smoking by the females, but there is no taboo against using smokeless tobacco. The prevalence rates of smoking and chewing tobacco vary widely by regions of India, and in many areas women are more likely to use oral tobacco products than smoke.[4] Reasons for starting may reflect local beliefs and cultural practice.In India there is widespread misconception that tobacco is good for teeth, so prevalence of application of tobacco products as dentifrice is commonly seen. Studies in many countries indicate that most tobacco use begins in early adolescence. The age of starting to use tobacco has important implications.[4] In developing countries, the lack of health education programmes result in girls having little knowledge of harmful effect of tobacco use.[4] MDG-4(reduce child mortality) and MDG 5(improve maternal health) are both also linked to the impact of tobacco use.[4] Maintenance of tobacco use results from nicotine addiction, lack of awareness of risk, difficulty in quitting ,which is driven by psychological and environmental factors as well as dependence.[4] Mishri is powdered form of roasted tobacco. It is common in Maharashtra and central regions of India, especially among women.

With the above background, the study was carried out with the intension to study the factors associated with and implications of Mishri use on nutrition and growth of vulnerable group of female adolescents.

**Material and methods**

A cross sectional study was carried out in the population covered by the Urban Health Training Centre, Department of Community Medicine, K.I.M.S., Karad, Maharashtra, India.Ethical clearance for carrying out the study was obtained from Institutional Ethical Committee.

All - adolescent girls in the age group of 10 to 19 years, in the population of the field practice area of the urban community health Centre were interviewed by house to house survey. Those who could not be contacted in spite of three consecutive home visits were considered as migrated from the area and excluded from the study. Those adolescent girls who came as guests, were also excluded.

The number of adolescent girls in the community was 254, out of which 200 could be



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contacted during the study period.The nature and purpose of the study was explained to the adolescent girls and their parents. Informed consent was taken and privacy, confidentiality and anonymity were maintained.

The data was collected using pretested structured proforma which included identification data, socio demographic data, and questions regarding Mishri use. Dietary intake was assessed using 24 hour recall method. Dietary calories, protein and Iron were calculated using food tables.

Haemoglobin was estimated by Sahli's haemoglobinometer. All ,200 adolescent girls were tested for Haemoglobin, none of the girls refused to give blood for carrying out Hb estimation. Statistical analysis was undertaken using SPSS 16 software.

## Results

Data was collected from total 200 adolescent girls in the age group 10-19 years. Among the 200 adolescent girls, 110(55%) belonged to early adolescence (10-14 years) and 90(45%) to late adolescence (15-19 years) age group. Distribution of Adolescent girls according to religion showed that the majority of them were Hindus120 (60%), 69(34.5%) were Muslims and 11(5.5%) were Sikhs or Buddhist. Majority of Adolescent girls162 (81%) belonged to nuclear family. Out of 200 Adolescent girls majority103 (51.5%) of them were involved in household work, 61(30.5%) were students, 30 were married and were housewives, other 6 adolescent girls were working as maid servants.

**Table 1:- Profile of adolescent girls**

| Particulars | Numbe | Percentage |
|---|---|---|
| **Age groups in completed years** | | |
| Early Adolescent (10 -14) | 110 | 55.0 |
| Late Adolescent (15 - 19) | 90 | 45.0 |
| **Marital Status** | | |
| Unmarried | 169 | 84.0 |
| Married | 31 | 16.0 |
| **Education** | | |
| Illiterate | 45 | 22.5 |
| 1-4 Primary | 49 | 24.5 |
| 5-10 Secondary | 98 | 49.0 |
| 11-12 Higher Secondary | 8 | 4.0 |
| **Religion** | | |
| Hindu | | 60.0 |
| Muslim | | 34.5 |
| Others | | 5.5 |
| **Type of family** | | |
| Nuclear | | 81.0 |
| Joint | | 13.0 |
| Broken | 9 | 4.5 |
| Three generation | 3 | 1.5 |
| **Major daily activity** | | |
| Student | | 30.5 |
| Household work | | 51.5 |
| Housewife | | 15.0 |
| others | | 3.0 |

Socioeconomic status – A very high (23%) non enrollment rate and (46%) school drop out rate was seen and only 31% adolescents were attending school. Majority (91.5%) of girls belonged to class V of modified B. G. Prasad classification.[5]



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**Table II. Distribution of Adolescent girls according to Mishri Use.**

| Category | Mishery Users | | Non Users | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Early Adolescents (10-14years) (n=110) | 11 | 16.2 | 99 | 75.0 | 110 | 155 |
| Late Adolescents (15-19years) (< n= 90) | 57 | 83.8 | 33 | 25.0 | 90 | 45 |
| | 68 | 100 | 132 | 100 | 200 | 100 |

($\chi 2$=62.7, D.F. =1, p<0.001)

Only 11 (16.2%) girls were Mishri users among early adolescence as compared to significantly higher number, i.e. 57 (83.8%) in late adolescence.

There was not a single Mishri user in adolescent girls if mothers were not using Mishri as compared to 35.2% of girls started using Mishri if mothers were Mishri users.

**Table III. Association of Habit of Mishri Use along Adolescents and their mothers.**

| | Adolescents | | | | | |
|---|---|---|---|---|---|---|
| Mothers | Mishery Users | | Non Users | | Total | |
| | No. | % | No. | % | No. | % |
| Mishery Users | 68 | 100 | 125 | 94.7 | 193 | 96.5 |
| Non Users | 0 | 0.0 | 7 | 5.3 | 7 | |
| Total | 68 | 100 | 132 | 100 | 200 | 96.5 |

($\chi 2$ = 3 .73, D.F. = 1, p = 0.053)

**Table IV. Mishery use according to schooling status**

| Mishery use status | School dropout | Student | Total |
|---|---|---|---|
| Non mishery user | 57(49.6%) | 58(50.4%) | 115 |
| Mishery user | 38(92.7%) | 3(7.3%) | 41 |
| Total | 95(60.9%) | 61(39.1%) | 156 |

($\chi 2$ = 23.5, D.F. =1, p=0.00)

There were significantly more girls using mishery,38 out of 95 (40%) among school dropouts as compared to 3 out of 61(4.9%) among school going girls



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**Table V. Mishri use and grades of Anaemia.**

| | Mishery Users | | Non Users | |
|---|---|---|---|---|
| **Grade of Anaemia** | **No** | **%** | **No** | **%** |
| **No Anaemia** | 0 | 0.0 | 2 | 1.5 |
| **Mild** | 40 | 58.8 | 97 | 73.5 |
| **Moderate** | 28 | 41.2 | 33 | 25.0 |
| **Total** | 68 | 100.0 | 132 | 100.0 |

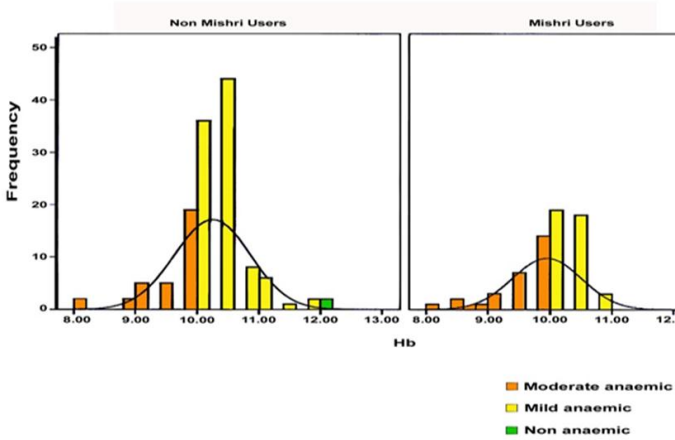
($\chi 2 = 8.045$, D.F. = 3, p=0.043)

All Mishri users had mild to moderate anaemia. Only two (1.5%) non users had haemoglobin value in the normal range. Proportion of girls with mild anaemia were more among non users as compared to Mishri users but proportion of moderate anaemia was significantly more among Mishri users. (Table IV)

There is a shift of the curve to the left among Mishri users as compared to non users (Fig1) with mean haemoglobin values of 9.95gm% and 10.24gm% respectively showing a significant difference (t = 3.281, p = 001) There was not a single girl with severe anaemia in either Mishri users or non Mishri users.

The use of Mishri increased with age. The anthropometric measurements as well as food intake are dependant on age, hence age wise analysis of these variables was undertaken.

**Fig. 1: Distribution of girls according to Hb level.**




There was no significant difference in the mean BMI as well as intake of calories, proteins and iron among misheri users and non users.

**Discussion**

Smokeless tobacco is consumed in various forms, of which Misheri (roasted and powdered tobacco) is commonly used in this part as dentifrice.

The study area Misheri is used mainly as teeth cleaning powder and the user does not swallow it, he/she considers it to be harmless. The user has a misbelief that it strengthens the teeth. Women apply Mishery in order to complete work at a greater speed as they think that it acts as a stimulant. Once habit is formed, it is very difficult to give up use of tobacco as it is known to be one of the most addicting agents. The addiction is associated with early initiation and prolonged and frequent use. Thus the use of tobacco in adolescent age group leads to habit formation which is very difficult to give



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Table VI-Comparison of intake of some important nutrients and anthropometric measurements among Mishri users and Non users.

| Age group wise categories | Mishery Users n=2,14,52 | Non-Mishery Users n=76,30,26 | 't' Test Value | p value |
|---|---|---|---|---|
| Daily Calorie Intake(Kcal) | | | | |
| 10 – 12 Yrs | 760.8±47.7 | 740.9±185.9 | 0.150 | 0.881 |
| 13 – 15 Yrs | 898.8±149.5 | 913.8±225.2 | 0.226 | 0.822 |
| 16 – 19 Yrs | 936.1±269.5 | 935.9±295.7 | 0.001 | 0.999 |
| Daily Protein Intake(gm) | | | | |
| 10 – 12 Yrs | 15.8±5.9 | 18±6 | 0.521 | 0.691 |
| 13 – 15 Yrs | 22.3±2.8 | 24.5±7.7 | 1.017 | 0.315 |
| 16 – 19 Yrs | 22.9±7.9 | 23.7±9.8 | 0.404 | 0.687 |
| Daily Iron Intake(mg) | | | | |
| 10 – 12 Yrs | 9.9±2.6 | 11.9±5.3 | 1.085 | 0.446 |
| 13 – 15 Yrs | 14.1±2.3 | 15.3±8.9 | 0.48 | 0.634 |
| 16 – 19 Yrs | 14.8±7.1 | 14±6.4 | 0.429 | 0.669 |
| BMI($kg/m^2$) | | | | |
| 10 – 12 Yrs | 15.5±0.7 | 15.03±1.9 | 0.348 | 0.729 |
| 13 – 15 Yrs | 17.3±2.5 | 17.4±2.5 | 0.127 | 0.9 |
| 16 – 19 Yrs | 18.5±2.8 | 17.7±2.7 | 1.244 | 0.217 |



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up afterwards. This is also associated with poor oral hygiene and risk of development of cancer.

In present study out of 68 (34%) girls who have been using Mishery 57(83.8%) belonged to late adolescent age group and 11(16.2%) to early adolescent age group. The girls having habit of Mishery use in the early adolescent age group (<14 years) is remarkable.

Heath education should be started during early adolescent age group, before the habit is formed. The ill effects of tobacco use even in the form of Mishery should be included in the curricular teaching of primary schools. For non-enrolments and school dropouts who form the main target group a different strategy needs to be adopted. Since all the adolescents have learned to use Mishery from their mothers, identification of female Mishery users in the population and their health education on following aspects may be helpful.

1) Tobacco from Mishery is mucosally absorbed.

2) People begin using mishery as a dentifrice, but soon turns into addiction. A typical user applies mishery to teeth and gums several times a day.

3) Mishery use during pregnancy is associated with adverse pregnancy outcome like preterm delivery, placental insufficiency and LBW.

This awareness and knowledge among mothers may play a pivotal role in prevention of use of Mishery by adolescent girls.

NFHS – 3[5] reported the percentage of women in the age group 15 to19 years who use any kind of tobacco has been 3.5%. The study by Kurulkar et al, [6] on 11th standard student of schools in Kunjirwadi and Khadakwasala during 1997 have found that 32.8% girls have been using Mishery.

A study on the current tobacco use (any product) among school students in Goa[7], has reported percentage of users as 4.5%, without much difference in smokeless tobacco use (2.8%) and in the form of smoking (3%). Smokeless tobacco use has been mainly in the form of applying Misheyi, tobacco containing toothpaste or toothpowder .Smoking among boys has been 3.5% and girls 2.2%. Tobacco use among parents has been positively associated with student's current tobacco use .

The Global Tobacco Youth Survey has focused on school students aged 13 to15 years, has found that the use of tobacco as dentifrice varied from 6% (Goa) to 68% (Bihar). Many students in India use tobacco products as dentifrice. Differences between the sexes have been minimal and has been similar to those



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reported globally. The results of prevalence of application of tobacco products as dentifrice, from the Global Youth Tobacco Survey in 14 states, in India, (2000-02)-has shown that the percentage in Maharashtra of use of tobacco as dentifrice, [product containing tobacco which included: Mishery (roasted and powdered tobacco) and dry snuff (bajjar or tapkir)] to be 9% (7% to 12%). [8]Kapoor S.K et al, [9] observed in Punjab that the prevalence of smoking among male adolescents has been14.2% compared to 2.3% in female adolescents. Smokeless tobacco use has been almost non existent in this age group.The Mishery use has been observed to be more among non-enrolled and school dropouts (39.7% and 55.9%) when compared withschool going girls (4.4%).

In the present study, there has been a significant association between Mishery use by mothers and their daughters. If mothers are using Mishery, than their daughters are more likely to use it. This shows that traditional values prohibited smoking but there is no taboo against smokeless tobacco use.

In the present study there has been a significant association between proportion of girls using Mishery and proportion of girls having moderate anaemia. There was no significant difference between the anthropometric measurements and the important nutrient intake among Mishery users and non users. Since intake of calories, proteins and iron and the height, weight and BMI are similar in both Mishery users and non users, use of Mishery does not seem to interfere with intake and absorption of proximate principles namely carbohydrates, fats or proteins. Higher proportion and higher grade of anaemia in Mishery users however indicates selective interference with iron absorption, as there is no difference in the consumption of iron by both Mishery users and non users.

These adolescent girls who did not go to schhol or if they were school dropouts,were mainly used for household chores.These girls in order to finish the work given to them did not eat even though they feel hungry.Instead of that they apply Mishery as they suppose it suppresses hunger and they can work faster. Since menstrual blood loss has started and there is a possible of adverse action on iron absorption, significantly more proportion of moderate anaemia is seen among Mishery users.

Rajani salunkhe et al[10] observed that tobacco exposure may alter homeostasis of iron (Fe), one of the most abundant and essential



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transition metals in the body. In this study, the effect of aqueous extract of smokeless tobacco was evaluated on Fe homeostasis in rats and human hepatoma, HepG2 cells. Findings suggested that tobacco consumption even at low doses impairs Fe homeostasis leading to Fe deficiency anaemia. Significant alterations were noted with respect to haematological parameters and expression patterns of selected intestinal Fe-transporters, Fe-binding proteins, and Fe-regulatory hormone, hepcidin. Impairment in the hepatic and renal antioxidant defence system was also observed in the treated rats. Histopathological studies revealed cirrhosis of liver and goblet cell hyperplasia of small intestine. Further, analysis of hepcidin promoter and its expression along with ferritin (expression and ELISA) in HepG2 cells demonstrated an enhanced expression of both the genes resulting in sequestration of Fe in treated cells, thus indicating systemic Fe deficiency.

This mechanism could explain higher proportion of adolescents using Misheri having higher proportion of moderate anaemia as compared to non users of Mishery when there is no significant difference in the dietary pattern,socioeconomic status as well as personal hygiene of both these groups.

This aspect needs further studies as anaemia during adolescence has far reaching consequences related to future child bearing and child rearing.

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**Original Research Article**

# Impact of Educational Intervention Measures on Knowledge regarding vitamin A and D fortified Soyabean oil among inhabitants of urban area of a city of central India

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**Abstract**

**Background**: Micronutrient deficiency is a significant public health problem in the developing world. Fortification of foods with micronutrients is a technologically, programmatically and economically-effective method of increasing micronutrient intake in populations. **Objective:** To assess the knowledge of fortification and awareness of fortified soybean oil with vitamin A and D, to increase the awareness about fortified oil in these families **Methodology**: An educational interventional study was conducted among 400 subjects randomly distributed in urban area of Indore City. Houses were selected using systematic random sampling. People who gave informed consent were included in the study. Semi structured Questionnaire was used as study tool. Data analysis was done using appropriate statistical tool (MS excel and SPSS version 20). Mcnemar test was applied. **Results:** The most commonly used cooking oil was Soyabean oil because of being relatively cheaper than other oils. 74% People preferred quality as basis of purchase of cooking oil after intervention. In pre intervention, only 12% people knew about fortification which increases to 72% after intervention. There was an increase in the knowledge about fortified soybean oil from 10% to 62%. Knowledge about other fortified products like salt, flour, Dalda was less (40%) in the community which further increased (83%) after intervention. **Conclusion:** Knowledge regarding vitamin A, D, fortification and advantages of fortified foods was less among participants which increase with intervention. Quality and cost were main factor in selection of edible oil.

**Key words**: Fortification, Vitamin A, Vitamin D, Fortified Soyabean Oil, Knowledge, Awareness

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## Introduction

Micronutrient deficiencies are responsible for significant public health problems in the developing world, causing premature death, disability, and reduced work capacity.[1] Dietary diversification is not always an option for poorer populations and government and external programming must be relied upon to remedy these deficiencies.[2] Fortification of foods with micronutrients is a technologically, programmatically and economically-effective method of increasing micronutrient intakes in populations [3, 4, 5]. Starting in the 20th century, fortification was used to target specific health conditions: goiter with iodized salt; rickets with



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vitamin D-fortified milk; beriberi, pellagra and anemia with B-vitamins and Fe-enriched cereals or flour.[6]

Fortification is defined as the addition of one or more essential nutrients to a food, whether or not it is normally contained in the food, for the purpose of preventing or correcting a demonstrated deficiency of one or more nutrients in the population or specific population groups.[7] Fortification of foods is one intervention for the prevention and control of micronutrient malnutrition, along with other food-based approaches and supplementation, the mix of interventions depending on the local situation, experience, commitment and resources, and infrastructure. Fortification has the advantage of requiring relatively less change in consumer behaviors and food habits than the other interventions.[6]

The addition of vitamins and minerals to industrially processed staple foods ensures that large population groups have access to essential nutrients without the need to change food consumption behaviors.[8] Fortification requires appropriate food vehicles that are widely consumed and accessible. Unfortunately, fortification is limited to the food vehicles that support certain vitamins and minerals. As well, there are instances in which deficiencies are too severe to correct with fortification.[9] Successful fortification programs have been identified as needing at least the following: strong political commitment and the ability to enforce regulations in a facilitative manner; early private sector involvement and willingness to comply with regulations; public sector backing including endorsement by professional medical organizations and financial support by donors; strong and active consumer education to raise consumer awareness and promote demand.[6]

National Family Health Survey (NFHS) 3[10] shows that the coverage of vitamin A supplementation is extremely low in Madhya Pradesh and only 20% of children between 12 and 35 months of age were given vitamin A supplement in the past six months and only 41% of children 6-35 months ate vitamin A rich foods. The National Nutrition Monitoring bureau [11] (NNMB) also found that 74% of children consume less than 50% of the recommended daily allowance of vitamin A through their diet in India. The most common food-fortification practice has been salt iodization, which has been in existence for over 70 years. Its success has been largely through its relative simplicity and low cost, but also the more recent international endorsement and advocacy and its coalition of partners. [12]

Based on data of a benefit–risk assessment published in 2009 by Bischoff-Ferrari et al. [13], it has been proposed that 800–1,000 IU of vitamin D per day may be needed to achieve a satisfactory status in all adults of 75–100 nmol/L of 25(OH)-D. Fortification of staple foods, such as cooking oil or ghee, with vitamin A is an effective and sustainable strategy to prevent vitamin A deficiency in a population. Oil was available in most of the households in this survey (95%). Over half of the households reported consuming greater than or equal to 1



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litre per capita of oil per month. [14] Fortification of edible oil has been identified as a cost-effective complementary strategy to tackle Vitamin A and D deficiencies, a major concern in Madhya Pradesh. The goal of this project is to improve the Vitamin A and D deficiencies by making fortified oil available through open market.

The present study principally aims to obtain information about preferred oil usage, knowledge of fortification and fortified soybean oil (with vitamin A and D). Through this study authors want to increase the awareness of usage of fortified oil and create a series of awareness campaign of fortified oil.

**Material & Methods:**

**Study Site**: An educational interventional study (KAP study) was conducted in urban area of Indore district. Study site was selected using simple random sampling method. Study site included an urban slum, an MIG colony and an HIG colony.

**Samples Size calculation**: Sample Size was calculated using formula $N= Z^2 [P (1-P)]/d^2$, d (width of confidence interval) was determined to be 5%, Z = 1.96 (5% precision), P (Prevalence) = 50%. Sample size comes out to be 385 which were rounded off as 400. Sample size was 400 people (both males and females).

**Sampling Technique**: Study population included all people residing at their house during interview. Households were selected by systematic random sampling as every fifth house was selected. If fifth household was closed or did not respond in three consecutive visits then next house was selected without disturbing allocation of next household. Inclusion Criteria included family members present at the time of pre intervention interview (Only one member selected from each family preferably female member, in absence of female member head of family who decide menu for family) and who gave informed consent.

**Study Tool**: A semi structured questionnaire was used as study tools for interview both pre interventional and post interventional. The questionnaire was designed to know their knowledge and awareness about Type of oil usage, Quantity of oil usage, Vitamin A and D, Oil fortification, Advantages of Fortification and Fortified Soyabean oil. Pretesting of questionnaire was done by using it in families residing in medical government quarters and appropriate changes were done on the basis of their results to increase its validity. Interpersonal communication using audio visual aids (Photographs & videos) and group discussion was adopted to obtain information.

**Study Duration**: Study Duration was 5 months duration (Oct.2013 to Feb 2014).

**Ethical Consideration**: Written informed consent was obtained prior to interview. Ethical permission was obtained both from departmental and institutional review committee.

**Statistical Analysis**: The data was analyzed using appropriate statistical software (MS excel



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and SPSS version 20). Mc Nemar test was applied for statistical significance of knowledge improvement by educational intervention.

## Results

In the present study, 43% people belonged to the age group of 25-56 years. The mean age was 37.2 ± 1.3 years. Out of 400 People, 91.5% were females and 8.5% were males. 34% people belong to middle (Class III) and 22% upper middle socio economic class (Class II) according to modified Kuppuswamy Classification. The most commonly used cooking oil was Soyabean oil after both pre (53%) and post intervention (73%). (Table 1)

**Table 1: Showing type of oil used by people in their daily uses (n=400)**

| Type of oil used in families | No. of users before intervention (%) | No. of users after intervention(%) |
|---|---|---|
| Groundnut oil | 14 | 6 |
| Soybean oil | 53 | 73 |
| Mustard oil | 11 | 2 |
| Sunflower oil | 20 | 19 |
| Any other | 2 | 0 |

Pre intervention 32% peoples were used more than 3 liters of oil for cooking which was decrease after intervention (22%), after intervention 52% were using one to two liters of oil. People preferred quality as basis of purchase of cooking oil pre interventional (58%) which increased to 74% after intervention, second to quality were cost and advertisement which changes from 22% to 16% and 22% to 14% respectively as result of intervention.

**Figure 1: Showing increase in knowledge about source of Vitamin A**

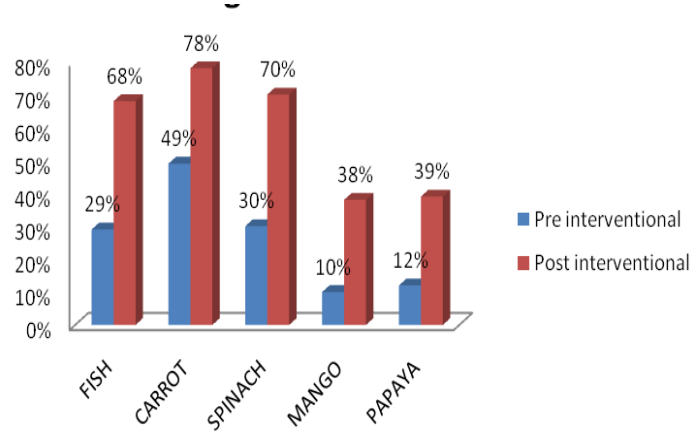
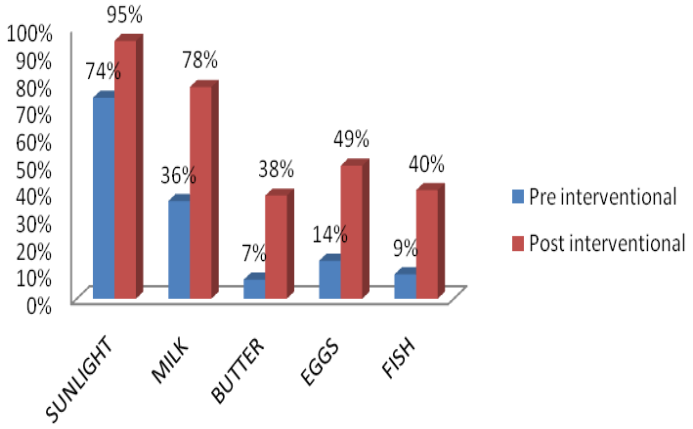



**Figure 2: Showing increase in knowledge about source of Vitamin D**




There was almost double the increase in the awareness about the quality of soybean oil in people from 35% to 68%. In case of Knowledge and awareness of Advantages of Vitamin A, 87% thought that it was useful for normal vision, 64% for healthy skin and 38% for immunity after intervention; in case knowledge of advantages of Vitamin D, 91% thought that it



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Table 2: Showing Knowledge and Awareness about Vitamin A and Vitamin D (n= 400)

| | | Pre interventional | | Post interventional | | P value |
|---|---|---|---|---|---|---|
| | | Yes | No | Yes | No | |
| **Advantage of Vitamin A** | For Normal Vision | 264(66) | 136(34) | 348(87) | 52(13) | <0.001 |
| | Healthy Skin | 152(38) | 248(62) | 256(64) | 144(36) | <0.001 |
| | Immunity | 64(16) | 336(84) | 152(38) | 248(62) | <0.001 |
| **Advantages Of Vitamin D** | For Normal Growth And Development Of Bones | 296(74) | 104(26) | 364(91) | 36(09) | <0.001 |
| | For Normal Levels Of Ca And Phosphate In The Body | 112(28) | 288(72) | 204(51) | 196(49) | <0.001 |
| **Diseases Caused By Deficiency Of Vita. A** | Night Blindness | 272(68) | 128(32) | 372(93) | 28(07) | <0.001 |
| | Dry Eyes | 96(24) | 304(76) | 256(64) | 144(36) | <0.001 |
| | Spots In Eyes | 56(14) | 344(86) | 224(56) | 176(44) | <0.001 |
| | Dry Skin | 48(12) | 352(88) | 188(47) | 212(53) | <0.001 |
| **Diseases Caused By Deficiency Of Vita. D** | Rickets | 192(48) | 208(52) | 316(79) | 84(21) | <0.001 |
| | Weakness Of Bones Specially In Pregnant And Lactating Women | 196(49) | 204(51) | 316(79) | 84(21) | <0.001 |
| | Pigeon Chest And Kyphoscoliosis | 20(5) | 380(95) | 180(45) | 220(55) | <0.001 |
| | Late Development Of Teeth In Children | 40(10) | 360(90) | 156(39) | 244(61) | <0.001 |
| **Importance of Vitamin A** | Protects From Night Blindness And Rickets | 184(46) | 216(54) | 304(76) | 96(24) | <0.001 |
| | Protects From Malnutrition | 152(38) | 248(62) | 276(69) | 124(31) | <0.001 |
| | Protects From Physical Deformities | 80(20) | 320(80) | 212(53) | 188(47) | <0.001 |
| | Immunity | 64(16) | 336(84) | 184(46) | 216(54) | <0.001 |
| **Time Spent In Sunlight** | 20 to 30 mint | 44(11) | 356(89) | 324(81) | 76(19) | <0.001 |



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Table 3: Showing Knowledge and Awareness about Fortification (n= 400)

| | Pre interventional | | Post interventional | | P value |
|---|---|---|---|---|---|
| | Yes | No | Yes | No | |
| **Knowledge About fortification** | 48(12) | 352(88) | 288(72) | 112(28) | <0.001 |
| **Knowledge About fortified Soyabean oil** | 40(10) | 360(90) | 248(62) | 152(38) | <0.001 |
| **Knowledge about some previous used fortified products (Salt, Flour, Dalda)** | 160(40) | 240(60) | 332(83) | 68(17) | <0.001 |
| **Sign of fortification** | 56(14) | 344(86) | 280(70) | 120(30) | <0.001 |
| **Ability of fortified oil in eliminating deficiencies** | 236(59) | 164(41) | 312(78) | 88(22) | <0.001 |
| **Production by State Govt. in collaboration with oil companies** | 32(8) | 368(92) | 272(68) | 128(32) | <0.001 |
| **Preference to fortified oil after knowing that equivalent of cost** | 232(58) | 168(42) | 312(78) | 88(22) | <0.001 |

was useful for normal growth and development, 57% for normal levels of Calcium and Phosphates levels in body. (Table 2)

**Discussion**

The most commonly used cooking oil was Soyabean oil because of being relatively cheaper than other oils. 74% People preferred quality as basis of purchase of cooking oil after intervention. In the study done in Oman when the head of the household was asked to list the three factors most considered when purchasing food, the responses reflected that quality (48%), expiry date (49%), price (34%) and country of the product (14%) took precedence over whether the food product was fortified (6%).[14] In contrast to this, people of Australia and New Zealand considered Price of food as important.[15]

Awareness in people regarding deficiencies caused by vitamin A such as night blindness, dry eyes and dry skin were 93%, 64% and 47% respectively after intervention while Awareness in people regarding deficiencies caused by vitamin D such as rickets , weakness of bones specially in pregnant and lactating women were changes from 48% to 79% , 49% to 79 respectively after intervention.

Before intervention, most of the people thought that the source of vitamin A was carrot but after intervention they came to know there were other sources like fish, spinach, mango and papaya. (Figure 1) In case of vitamin D most of people knew that sunlight was main source, which further increased after intervention. (Figure 2)

Most of the people knew the importance of vitamin A and D but after intervention people came to know about the importance of vitamin A and D in children for protection from night blindness and rickets which was increased from 46% to 76%, protection from malnutrition from 38% to 69%, protection from physical deformities from 20% to 53%, provides



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immunity from 16% to 46%. The time spent in sunlight by people was sufficient for them for the normal level of vitamin D in the body. There was significant change in the knowledge about benefits of fortified soybean oil over simple soybean oil from 61% to 86% as a result of intervention.

In Pre intervention, only 12% people knew about fortification which increases to 72% after intervention. Similarly in study by Ronald et al, People were aware of concept of Adding minerals and vitamins in their food Stuff.[15] There was an increase in the knowledge of people about fortified soybean oil from 10% to 62%. Knowledge about other fortified products like salt, flour, Dalda was less (40%) in the community which further increase (83%) in intervention. Similar finding was found in Oman, as awareness of flour fortification was low among women with only 5% and 6% reporting to know that bread and flour are fortified, respectively. There was more public awareness of salt iodization than flour fortification; 36% of heads of household knew that salt in Oman is iodized, but less than 10% of heads of household knew that flour is fortified.[14] (Table 3) there was 14% household used fortified oil in their daily routine which increases to 54% after education intervention. Follow up about the practicing of fortified oil was done after 3 months of intervention. Upper middle socioeconomic group contributes maximum (22%) portion of practice after intervention.

Govt. of M.P. in collaboration with an oil production company started producing fortified Soyabean oil, through this study people were aware about this scheme, with cost of oil was just like unfortified simple Soyabean oil and also thought of people were changed from 59% to 78% regarding ability of fortified soybean oil in eliminating deficiencies of vitamin A and vitamin D.[17]

The findings in the present study reiterate the need for re-enforcing health education in urban area. Consumers must be informed about the importance of vitamins and minerals in their diets and that the benefits of fortified food are an inexpensive strategy to improve the health status for all people, especially women and children. While the health worker (ANM and USHA) and AWW can plays a pivotal role in imparting health education, the use of multi-pronged methods such as films, group discussions, dramas, puppet shows and role-plays must be incorporated. There is a strong need that school education especially for adolescent girls must directly address advantages of fortified foods. The public and private sectors should work collaboratively to improve the population's access to quality foods adequately fortified with vitamins and minerals. Appropriate laws and regulations, combined with sustained monitoring, and quality control are needed to guide food fortification program.

Study was concluded as Soyabean oil is commonly used, quality was main basis of purchase of cooking oil, second was cost of cooking oil. Knowledge regarding vitamin A,



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D, fortification and advantages of fortified foods was less among females which increase with intervention. Quality and cost were main factor in selection of edible oil.

Food fortification with vitamin A, D and other Vitamin and minerals is a cost effective multisectoral approach to improving deficiency in micronutrients for vulnerable populations such as women of reproductive age and children aged less than 15 years. However, its sustainability will depend on increased public-private partnership, awareness of the benefits of fortified foods, plus legislation to make fortification mandatory.[16]

This study was carried out with 400 people who was not representative of Indore city, needs more sample size to be incorporated which unfortunately was not included due to time constraint. Also due to time people of different socio economic strata were not incorporated and prospective advantages of fortified foods on their health were not obtained.

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**Conflicts of Interest**: **None**

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**Original Research Article**

# Determinants of Institutional Delivery among Women in rural area of Belgaum, Karnataka

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**Abstract**

**Background:** Maternal mortality continues to be a challenge for achieving the fifth millennium development goal in India. Place of delivery is a crucial factor which affects the health and wellbeing of the mother and newborn. One of the key to reducing the high maternal mortality in India is Institutional delivery which ensures safe birth with skilled assistance. To increase the institutional deliveries in Karnataka, various incentives are also provided. Therefore the present study was done to assess the determinants of institutional deliveries. **Methods:** Community-based cross-sectional study was conducted among women with child birth in the previous year, during July– December 2008. A total of 170 women from two subcentres of Handignur Primary health centre in Belgaum district were included in the study. A pre tested and structured questionnaire was used to collect data. Data analysis was performed using SPSS version 16.0. **Results:** The present study revealed out of 170, 125 (73.5%) of women had institutional deliveries and safe delivery was noted in 141 (82.9%) of women. Home deliveries were noted in 45 (26.5%) of women, 54 (31.8%) delivered at Government health facility and 71(41.7 %) at private hospitals. The percentage of institutional delivery was more among educated women, those who had utilized full antenatal care and among women with low parity. **Conclusion**: In this study, utilization of institutional delivery service is optimal; women were more likely to practice institutional delivery. This study indicated that education, parity of the women, utilization of full antenatal care (ANC) are independent predictors of delivery service utilization. Hence, intensifying education for women and health education to increase early registration and utilization of full ANC service are recommended to promote institutional delivery service utilization.

**Keywords:** Institutional delivery; determinants; rural area.

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## Introduction

Care of mothers and children has been in existence from the beginning of the civilization. The great physicians of those times Charaka and Sushrutha in India have described care of the mother and child, the midwifery work was in the hands of trained women, who imparted advice on hygiene, diet and general care.[1] In the late 19th century first effort was made to improve MCH services in India through establishment of training for Dias in Amritsar in 1880. Later in 1902, first midwifery act was enacted to promote safe delivery. [2]



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The primary aim of safe motherhood is to achieve a healthy mother and a healthy baby at the end of pregnancy. But even today, delivery is an event where life and death stand side by side for both, the expectant mother and her forthcoming newborn. Any neglect or delay in care can adversely affect the wanted outcome.[3] According to World Health Organization (WHO), global maternal mortality rate (MMR) is 400 maternal deaths per one lakh live births, among which 11-17% of maternal deaths happen during delivery.[4]

India alone accounts for nearly 20% of the global burden of both maternal and child deaths against about 16% of its share in world population.[3] In India, among the National Socio-Demographic Goals for 2010, certain goals are directed towards safe delivery viz. to achieve 80 per cent institutional deliveries and 100 per cent of deliveries by trained personnel by 2010.[4] National Rural Health Mission (NRHM) has envisaged to ensure all deliveries in institutions.

**Objectives**

1. To study the institutional delivery services utilization pattern of in rural areas of Belgaum
2. To study the socio-demographic determinants of institutional delivery.

**Materials and Methods**

A community-based, cross-sectional study was carried out during July to December 2008 in Handignur and Shivapur subcentres of Handignur primary health centre in Belgaum district, Karnataka. The study participants comprised mothers aged 15-49 years who delivered a child in the previous year and residing in the study area. A door-to-door survey was conducted and a total of 170 mothers were selected and interviewed for data collection. A pre-designed, pre-tested, questionnaire was used to collect the socio-demographic profile and details of delivery services availed for the pervious delivery by the women.

Women who had at least three visits for antenatal check-up, received at least one TT injection and consumed ≥100 IFA tablets/ syrup was considered to have utilized full antenatal care.[5]

Institutional delivery includes delivery in a Government health centre such as subcentre, primary health centre, community health centre, first referral unit, district or state hospital and private hospital.[6]

Safe delivery is defined as institutional deliveries plus deliveries conducted at home but by skilled staff and do not include deliveries by trained birth attendant (dais).[4]

Data analysis was done using SPSS software version 16, Proportions were calculated and Pearson's chi-square was used as test of significance and p value <0.05 was considered significant.

## Results

The socio-demographic profile of the study subjects is given in Table 1. Majority, 119



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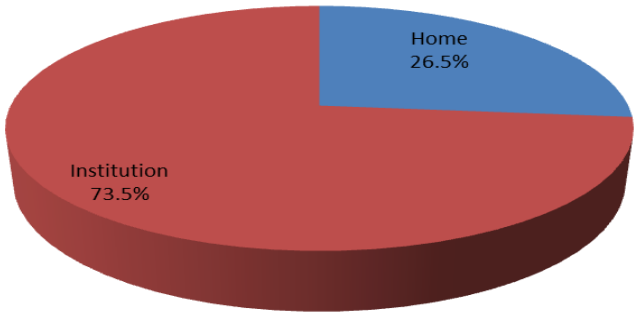
(70%) of the women were in the age group of 20-24years; 56 (32.9%) were illiterates. None of the women belonged to class I, 86 (50.6%) of women belonged to class IV socio-economic status according to modified BG Prasad Classification. Majority 138 (81.1%) of women lived in joint family; 124 (72.9%) were homemakers and the other 46 (27.1%) worked as daily wagers. Out of 170 women, 147(86.5%) had full term delivery and 23(13.5 %) had preterm deliveries. Majority 162(95.3%) had vaginal delivery and only 8(4.7%) underwent caesarian section.

The present study revealed out of 170, 125 (73.5%) of women had institutional deliveries and safe delivery was noted in 141 (82.9%) of women. Home deliveries were noted in 45 (26.5%) of women; 54 (31.8%) delivered at government health facility and 71(41.7 %) at private hospitals (Figure 1). A nurse/ auxiliary nurse midwife (ANM) conducted 31(18.2%) deliveries, 9 (5.3%) deliveries were conducted by trained birth attendants (TBA); untrained birth attendants and relatives conducted 20(11.8%) deliveries, while 100 (64.7%) deliveries were attended by doctors. Among the newborn, 88 (51.8%) were male and 82 (48.2%) were females. Birth weight was recorded in 125(73.5%) newborns (all delivered at health facility).Among the women of Handignur subcentre 16.1% had home deliveries compared to 37.3% of women from Shivapur subcentre which was statistically significant($p<0.05$). The difference between the institutional deliveries among illiterate women (53.6%) compared to literate women (83.3%) was statistically significant ($p=0.00$). Literacy status of husband was also significantly associated with place of delivery ($p=0.00$). Even though all (100%) women belonging to Class II socio-economic status had Institutional deliveries compared to 63.6% of women of Class V socio-economic status, the association was not significant statistically($p>0.05$)).

**Fig 1: Distribution of women according to place of delivery**




Parity and institutional delivery were inversely related with 79.8% of women with parity 1& 2 having institutional deliveries compared to 53.7% of women with higher parity($p=0.001$). Women who had three or more antenatal visits were more likely to have institutional deliveries (83.5%) compared to those who had less than three antenatal visits (44.2%; $p=0.00$). Utilization of full antenatal care was also significantly associated ($p=0.00$) with place of delivery, as home deliveries were more common among women who had not utilized (40.5%) compared to those who utilized (15.6%) full antenatal care.

Institutional deliveries decreased with age, but the association was not significant. Type of the



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family in which the women lived also did not influence the place of delivery.

**Table 1: Socio-demographic profile of the women.**

| Character | Group | Frequency | Percent |
|---|---|---|---|
| **Age** | ≥19 | 11 | 6.5 |
| | 20-24 | 119 | 70.0 |
| | 25-29 | 34 | 20.0 |
| | 30-34 | 2 | 1.2 |
| | ≥35 | 4 | 2.4 |
| | **Total** | **170** | **100.0** |
| **Religion** | Hindu | 167 | 98.2 |
| | Muslim | 3 | 1.8 |
| | **Total** | **170** | **100.0** |
| **Education** | Illiterate | 56 | 32.9 |
| | Primary school | 40 | 23.5 |
| | Middle school | 42 | 24.7 |
| | High school | 32 | 18.8 |
| | **Total** | **170** | **100.0** |
| **Socio-economic status** | Class II | 9 | 5.3 |
| | Class III | 53 | 31.2 |
| | Class IV | 86 | 50.6 |
| | Class V | 22 | 12.9 |
| | **Total** | **170** | **100.0** |
| **Parity** | <3 | 129 | 75.9 |
| | ≥3 | 41 | 24.1 |
| | **Total** | **170** | **100.0** |

**Table 2: Delivery Pattern among the study participants.**

| Character | Group | Frequency | Percent |
|---|---|---|---|
| Place of delivery | Home | 45 | 26.5 |
| | Government | 54 | 31.8 |
| | Private | 71 | 41.7 |
| | **Total** | **170** | **100.0** |
| Person conducting Delivery | ANM | 22 | 12.9 |
| | Nurse | 9 | 5.3 |
| | Doctor | 110 | 64.7 |
| | TBA | 9 | 5.3 |
| | Untrained TBA | 18 | 10.6 |
| | Relatives | 2 | 1.2 |
| | **Total** | **170** | **100.0** |



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**Table 3: Association between socio-demographic factors and institutional deliveries**

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| Factor | Group | Delivery | | Total |
|---|---|---|---|---|
| | | Home | Institution | |
| SUBCENTRE<br>Pearson $\chi^2$= 9.862, df=, p=.002 | Handignur | 14(16.1%) | 73(83.9%) | 87(100.0%) |
| | Shivapur | 31(37.3%) | 52(62.7%) | 83(100.0%) |
| | Total | 45(26.5%) | 125(73.5%) | 170(100.0%) |
| EDUCATION<br>Pearson $\chi^2$= 9.862, df=, p=.002 | Illiterate | 26(46.4%) | 30(53.6%) | 56(100.0%) |
| | Literate | 19(16.7%) | 95(83.3%) | 114(100.0%) |
| | Total | 45(26.5%) | 125(73.5%) | 170(100.0%) |
| PARITY<br>Pearson $\chi^2$= 10.961, df=, p=.001 | Parity 1& 2 | 26(20.2%) | 103(79.8%) | 129(100.0%) |
| | Parity .≥3 | 19(46.3%) | 22(53.7%) | 41(100.0%) |
| | Total | 45(26.5%) | 125(73.5%) | 170(100.0%) |
| FULL ANTENATAL CARE<br>Pearson $\chi^2$= 13.328, df=, p=.000 | Utilized | 15(15.6%) | 81(84.4%) | 96(100.0%) |
| | Not utilized | 30(40.5%) | 44(59.5%) | 74(100.0%) |
| | Total | 45(26.5%) | 125(73.5%) | 170(100.0%) |
| OCCUPATION<br>Pearson $\chi^2$= 14.777, df=, p=.000 | Homemaker | 23(18.5%) | 101(81.5%) | 124(100.0%) |
| | Daily wager | 22(47.8%) | 24(52.2%) | 46(100.0%) |
| | Total | 45(26.5%) | 125(73.5%) | 170(100.0%) |
| ANTENATAL VISITS<br>Pearson $\chi^2$= 25.463, df=, p=.000 | <3 | 24(55.8%) | 19(44.2%) | 43(100.0%) |
| | ≥3 | 21(16.5%) | 106(83.5%) | 127(100.0%) |
| | Total | 45(26.5%) | 125(73.5%) | 170(100.0%) |



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## Discussion

Majority of mothers (86.5%) in our study had full term deliveries & 13.5% had preterm delivery. In a study done in rural Maharashtra, 80% mothers had full term live birth, 15% had preterm delivery and 5% had post term delivery.[7] Our study revealed that, 95.3% mothers had normal vaginal delivery, only 4.7% delivered by caesarean section. A study done in Balmiki Basti of New Delhi showed that 95.1% of mothers had normal vaginal delivery and 4.8% delivered by caesarean section.[8]According NFHS – III (2007-08), in India 38.7% of women had institutional deliveriries.[9] Our findings of higher (73.5%) institutional deliveries are in accordance with DLHS-III, which states in rural Belgaum 71.7% of mothers had institutional deliveries,[5] few other study also found higher prevalence of institutional deliveries.[10&11] In the present study 82.9% of mothers had safe delivery, DLHS -3 found 80.8% had safe delivery in Belgaum.[5]

In a study done in rural area of Marthwada (in Maharashtra), the prevalence of home delivery was 23.07%, 18.66% delivered at government institutions, 58.27% at private hospitals,[10] in our study it was 26.5%, 31.8% and 41.7% respectively . In rural Madhya Pradesh, 67.8% of mothers delivered in government hospitals.[11]A nurse/ANM conducted 18.2% of deliveries, 5.3% of deliveries were conducted by trained birth attendants (TBA), untrained birth attendants and relatives conducted 11.8% of deliveries while 64.7% of deliveries were attended by doctors. According to NFHS-III, in Karnataka 71.3% of the deliveries were assisted by skilled health personnel.[12] It high(82.9 % ) in our study in our study. In a study done in Birbhum district of West Bengal 33.4% of deliveries were conducted by doctors, 27.81% by ANM/ Nurses, 13.76% by trained TBA and 25% were conducted by unskilled person.[13]

In our study, majority 51.8% of newborns were males and 48.2% were females. Birth weight was recorded in 73.5% of birth. Birth weight of babies was not recorded in deliveries conducted at home. In a study conducted in Lucknow district, birth weight was measured in all institutional deliveries; this was similar to our study.[14] Literacy status of the women significantly influenced the place of delivery in the present study. In a study done in slums of Nanital, education of mother played a crucial role in making the decision about place of delivery ($p< 0.001$). Mothers educated up to graduation and above (54%) opted for delivering their child at a hospital. Deliveries were conducted at home for mothers who were either illiterate (19%) or educated up to fifth standard (30%).[15]

In the present study, institutional deliveries increased with increase in socioeconomic status of the family but the association was not significant, may because there were no women belonging to Class I and only 9 (5.3%) in Class II Socio-economic status. However in other studies socio-economic status significantly influenced the institutional deliveries.[10,11,15&16] In our study, more number of housewives (81.5%) had institutional deliveries compared to



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working women (52.2%). This difference was statistically significant (p=0.00). Similar findings were found in a study done in Nepal.[16] Most of the working women were daily wagers, having lower education and socio-economic status, hence they might have opted for home deliveries. In our study, association of type of family and utilization of intra-natal services was not statistically significant. Similar finding was made in studies conducted in slums of Nainital district.[15] Our study findings are similar to study conducted in rural Marthwada[10] and slums of Davangere[17] in which institutional deliveries were more among mothers of lower parity compared to mothers of high parity. This difference in our study is statistically significant. According to NFHS-III, as the parity increased number of mothers who had institutional deliveries decreased. [9]

In Marthwada, non-registration for ANC and non-availability of transport facility were significantly associated with the risk of home delivery, [10] in our study also women who had not utilized full antenatal care had significantly higher home deliveries. Institutional deliveries were less among Shivapur sub-centre which is far away from primary health centre having minimal transport facility.

**Conclusion:** In the present study institutional delivery service utilization was optimal as most of the women had institutional delivery. Education, parity status and utilization of antenatal care significantly influenced the place of delivery. Policy makers, health service organizations, community leaders and other concerned bodies have to consider the predictors of institutional delivery like education, parity, antenatal care utilization and residence to improve institutional delivery in the area.

**Acknowledgment**

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**Original Research Article**

# Knowledge, Attitude and Practices on medical ethics among students of a medical college in Chennai, Tamil Nadu

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**Abstract**

**Background: -** Ethics is a science of moral values or principles. The principle objective of the medical profession is to render service to humanity with full respect. Ethics teaching has shown to have influence on the professionalism and moral qualities of medical professionals. **Objectives:** - 1) To assess the knowledge, attitude and practice of medical ethics among undergraduate students. 2) To compare the scores of students at different levels of seniority of students in the college. **Methodology: -** A descriptive cross sectional study was carried out using a self-administered questionnaire among undergraduate medical students of Second MBBS to Final MBBS .Out of 375 total students, 335 of them participated in the study . **Analysis: -** Data was analysed by proportion and mean score using SPSS version 16. Attitudinal questions response options were given a score, with the most desirable response receiving highest number. Each student total score was categorised as poor, fair, good and very good.**Result:-** Majority of students (38.5%) agreed that awareness of medical ethics was extremely important. Clinical Training was the source of knowledge and preferred mode of teaching. Nearly half of the respondents (57.6%) had good score. There was no increase in scores corresponding with additional years of medical education. **Conclusion: -** The study highlights lack of awareness of medical ethics among medical students. To strengthen this awareness clinically oriented measures like case study, workshops etc should be conducted.

**Key Words**: - medical ethics, medical students, code of conduct, medical professionals.

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## Introduction

Ethics is a science of moral values or principles. Medical ethics is thus described as moral principles, which should guide the members of medical profession in their dealings with the patient, their relatives, and community and with other colleagues in profession. The principle objective of the medical profession is to render service to humanity with full respect for dignity of human beings.

Every doctor, whatever is his/her specialty has to discharge medico-legal responsibilities and to solve medico-legal problems from the very first day of his/ her medical practice .Almost everything a doctor does in practice of medicine is in some manner or other is governed by legal system. Hence, it is



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absolutely essential that every member of medical profession should know exactly what are their duties and right attitude towards their patients. They should also know who the authorities are, proposing these rules in the institution. After the advent of Consumer Protection Act, the medical profession is threatened with uncertain situations, of who among his patients and when converts himself into a consumer and charges him with a case demanding huge sum of money for damage suffered by him as compensation. To that end the indemnity insurance serves the purpose [1]

Ignorance about medical ethics and law by young medicos leads to the consequences of negligent behavior or failure to discharge compulsory duties towards patient and state amounting to either infamous conduct or negligent charges. Our aim is to make our graduates better doctors who adhere to their best to professional standards to provide optimum health care to the patients with full respect and dignity.

Nowadays, medical practice throughout the world has become increasingly commercialized, and ethics has taken a back seat. Ethics teaching has shown to have influence on the professionalism and moral qualities of medical professionals.[2] Various methodologies have been tried to stimulate better ethical conduct in professionals such as lectures, seminars, interactive workshops and case conference. The effectiveness of clinical learning approaches is well documented [3-5].

During the past 30 years new medical technologies and public concern about medical ethics have led medical schools in Europe and North America to increase their teaching of formal ethics considerably. Most of this teaching focuses on dilemmas that students may face in

their future practice, rather than the ethical problems they encounter as medical students. Several studies and editorials suggest that students' clinical experiences con-stitute an informal or "hidden" ethics curriculum,[6] which can undermine their developing professionalism. Clinical teachers who act as negative role models, especially those who show unethical behavior towards patients, is the most frequently cited problematic aspect of this hidden curriculum.[6,7]

On this back ground, this study was conducted to assess the knowledge, attitude and practice of medical ethics among undergraduate students along with comparison scores of students at different levels of seniority in the college.

**Aims and Objectives**-1) To assess the knowledge, attitude and practice of medical ethics among undergraduate students of a Private Medical College in Chennai.

2) To compare the scores of students at different level of seniority of students in the college.



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**Methodology**

A descriptive cross sectional study was carried out from September to December 2013 among undergraduate medical students of different batches from II$^{nd}$ MBBS to Final year students. First year students were excluded as they have no clinical experience. Institutional ethical committee clearance was applied and obtained. All students of selected years were briefed on the study purpose and requested to participate in the study. Students were assured that participation is voluntary and confidentiality of student will be maintained. Verbal consent of students was taken before starting the study. Of total 375 students enrolled, 335 students completed the study-a response rate of 89%.

A self-administered, semi structured questionnaire was prepared based on previous research studies and literature study. Some questions were also derived from the code of medical ethics as laid down by Tamil Nadu Medical Council. Pilot study was done on 10 post graduate students and necessary modification was done in the final questionnaire. The first section of the questionnaire covered demographic information. The second part of the questionnaire contained questions about their awareness of ethics and its importance; in third part, their attitude on various issues such as consent and confidentiality, euthanasia and intimate examination etc related to the principles of medical ethics and lastly knowledge of code of medical ethics of Tami Nadu medical council.[8]

**Data Analysis: -** The collected data was analysed by proportion and mean score using SPSS vertion-16. Attitudinal questions included a range of response options in accordance with Likerts 5 point scale (strongly agree, agree, uncertain, disagree and strongly disagree).The response to each question were given a score, with the most desirable response receiving highest number. The most desirable response of each question was decided before hand from literature study and also consultation with forensic experts. Each student total score was categorised as follows: poor- 50 or below50, fair-51-60, good-61-70 and very good above 70 out of maximum possible score of 100.

**Results**

Total 335 participants were of age ranging from 19 to 28 years**.** Their mean age was 21 years.

Table I describes about students knowledge of medical ethics, the source of information and also preferred mode of teaching medical ethics.30.14% of students were positive about the importance of ethical knowledge.42.8% of final year and43.3% of IV year students opined it to be extremely important and totally 38.5% thought it be extremely important. Only 1 student of III year gave negative response.

The predominant source of information was found to be Clinical training (58.5%) and



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**Table-I: Medical Students according to their Knowledge of Medical Ethics**

| **Medical Students according to their Knowledge of Medical Ethics** | | | | | |
|---|---|---|---|---|---|
| **Knowledge** | **II Year ,N=57 No(%)** | **III year, N=81 No(%)** | **IV year, N=106No(%)** | **Final year, N=91,No (%)** | **TOTAL,N=335 No(%)** |
| **Importance of ethical knowledge in medical profession** | | | | | |
| Not at all | 0(0%) | 1(1.2%) | 0(0%) | 0(0%) | 1(1.2%) |
| Somewhat Important | 3(5.2%) | 3(3.7%) | 3(2.8%) | 1(1.09%) | 10(2.98%) |
| Important | 20(35.08%) | 30(37.03%) | 29(27.35%) | 22(24.17%) | 101(30.14%) |
| Very Important | 18(31.5%) | 19(23.45%) | 28(26.41%) | 29(31.86%) | 94(28.05%) |
| Extremely Important | 16(28.07%) | 28(34.56%) | 46(43.39%) | 39(42.85%) | 129(38.50%) |
| **Source of Knowledge of Medical Ethics among undergraduate students**. | | | | | |
| Lecture class | 41(71.9%) | 31(38.26%) | 54(50.9%) | 25(27.47%) | 151(45.07%) |
| Ethical books | 8(14.03%) | 14(17.2%) | 20(12.5%) | 8(8.7%) | 50(14.92%) |
| Seminar & workshops | 15(26.3%) | 11(13.5%) | 22(20.75%) | 9(9.89%) | 57(17.01%) |
| Clinical training | 29(50.8%) | 51(62.96%) | 55(51.88%) | 61(67.03%) | 196(58.50%) |
| Journals | 8(14.08%) | 5(6.17%) | 7(6.60%) | 3(3.29%) | 23(6.86%) |
| Media | 27(47.36%) | 26(32.09%) | 40(37.7%) | 8(8.79%) | 101(30.14%) |
| **Preferred Mode of teaching of Medical Ethics among students** | | | | | |
| Lecture class | 19(33.3%) | 11(13.5%) | 19(17.9%) | 6(6.5%) | 55(16.41%) |
| Group Discussion | 37(64.9%) | 27(33.3%) | 35(33.01%) | 5(5.4%) | 104(31.04%) |
| Seminar& workshops | 8(14.03%) | 11(13.5%) | 24(22.64%) | 33(36.26%) | 80(22.68%) |
| Audiovisual Aids | 17(29.8%) | 12(14.8%) | 45(42.45%) | 6(6.59%) | 80(23.88%) |
| Clinical training | 17(29.8%) | 42(51.8%) | 52(49.05%) | 16(17.58%) | 127(37.9%) |
| Others | 2(03.5% | 7(08.6%) | 6(5.66%) | 40(43.95%) | 55(16.4%) |
| **Is there Ethics committee in this institution?** | | | | | |
| Yes | 17(29.8%) | 18(22.2%) | 30(28.3%) | 20(21.9%) | 85(25.37%) |



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| | | | | | |
|---|---|---|---|---|---|
| No | 4(07.01%) | 25(30.8%) | 12(11.3%) | 11(12.08%) | 52(15.5%) |
| Dont Know | 36(63.1%) | 38(46.9%) | 64(60.3%) | 60(65.9%) | 198(59.1%) |

**Table-II: Comparison of Attitude scores of different years of student**

| **Comparison of Attitude scores of different years of student** | | | | | |
|---|---|---|---|---|---|
| **No** | **Statements on Ethical Issues** | **II Year Mean (95%CI)** | **IIIYear Mean (95%CI)** | **IVYear Mean (95%CI)** | **VYear Mean (95%CI)** |
| 1. | Ethical conduct is important only to avoid legal action | 3.18 ±0.29 | 2.93 ±0.19 | 3.14 ± 0.20 | 3.12 ± 0.22 |
| 2. | During clinical rounds along with clinical aspects of patient's care it is also essential to discuss ethical, social and legal issues of that patient | 3.44 ± 0.33 | 3.54 ±0.20 | 3.66 ± 0.16 | 3.96 ±0.18 |
| 3. | Patient's wishes must always be adhered to. | 2.11 ± 0.27 | 2.17 ± 0.26 | 2.49 ± 0.23 | 2.96 ± 0.22 |
| 4. | Doctors should always do what is best irrespective of patient's opinion. | 3.07 ± 0.34 | 3.12 ±0.31 | 3.30 ± 0.23 | 3.04 ± 0.27 |
| 5. | Patient should always be told if something is wrong. | 3.77 ± 0.26 | 3.98 ± 0.21 | 4.16 ± 0.18 | 3.82 ± o.24 |
| 6. | Confidentiality cannot be kept in modern care and should be abandoned. | 3.02 ± 0.33 | 3.12 ±0.20 | 3.64 ± 0.20 | 2.12 ± 0.25 |
| 7. | Close relatives must always be told about patients condition. | 1.88 ± 0.24 | 1.94 ± 0.22 | 2.32 ± 0.20 | 3.70 ± 0.25 |
| 8. | Patients consent is needed only for operation but not for investigation or treatment. | 3.33 ± 0.39 | 3.32 ± 0.29 | 3.86 ± 0.25 | 3.81 ± 0.27 |
| 9. | Children should not be treated without consent of parents or guardians. | 3.93 ± 0.32 | 3.99 ± 0.27 | 4.01 ± 0.22 | 2.24 ± 0.30 |



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| | | | | | |
|---|---|---|---|---|---|
| 10. | Doctors and nurses should refuse to treat patients who behave violently. | 2.37 ± 0.32 | 2.33 ± 0.22 | 2.37 ± 0.19 | 3.03 ± 0.24 |
| 11. | If a patient refuses treatment due to traditional belief they should be instructed to find another doctor with their beliefs or accept the treatment offered. | 2.82 ± 0.36 | 3.36 ± 0.24 | 3.08 ± 0.20 | 4.12 ± 0.26 |
| 12. | If a patient wish to die should be assisted in doing so no matter what his/her illness. | 3.00 ± 0.43 | 3.85 ± 0.24 | 3.92 ± 0.19 | 3.12 ± 0.21 |
| | Total | 2.99 ± 0.35 | 3.13 ± 0.39 | 3.32 ± 0.37 | 3.33 ± 0.39 |

**Table-III: Comparison of respondent's attitudinal scores regarding intimate examination**

| **Comparison of respondent's attitudinal scores regarding intimate examination.** | | | | | |
|---|---|---|---|---|---|
| **No** | **Intimate Examination of patient** | **II Year Mean (95% CI)** | **III Year Mean ( 95% CI)** | **IV Year Mean (95% CI)** | **VYear Mean (95% CI)** |
| 1. | Follow certain guidelines like informed consent, confidentiality and keeping a nurse or female assistant during intimate(vaginal, rectal) examination of female patient. | 3.86 ± 0.37 | 4.23 ± 0.22 | 4.34 ± 0.18 | 4.40 ± 0.19 |
| 2. | Privacy of patient must be ignored for the benefit of larger group. | 2.68 ± 0.32 | 3.42 ± 0.24 | 3.01 ± 0.25 | 3.12 ± 0.28 |
| 3. | This should be followed even for sedated patient. | 3.30 ± 0.40 | 3.69 ± 0.23 | 3.65 ± 0.23 | 3.7 ± 0.24 |
| | Total | 3.00 ± 0.9 | 3.78 ± 0.46 | 3.66 ± 0.76 | 3.74 ± 0.74 |



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**Table-IV: Mean score of knowledge of code of conduct of Tamil Nadu Medical Council**

| Mean score of knowledge of code of conduct of Tamil Nadu medical council | | | | | |
|---|---|---|---|---|---|
| **S. No** | **Statement of acceptable behavior of a physician** | **II Year Mean (95% CI)** | **III Year Mean (95%CI)** | **IV Year Mean (95%CI)** | **VYear Mean (95% CI** |
| 1. | A physician has right to advertise his services. | 2.14 ± 0.35 | 2.73 ± 0.26 | 3.42 ± 0.24 | 3.22 ± 0.26 |
| 2. | A physician may run an open shop for dispensing drugs & appliances prescribed by others. | 2.84 ± 0.32 | 3.26 ± 0.23 | 3.75 ± 0.19 | 3.48 ± 0.25 |
| 3. | In practice it is better to use brand name instead of generic name of drugs. | 2.47 ± 0.29 | 2.75 ± 0.20 | 2.87 ± 0.23 | 3.17 ± 0.24 |
| 4. | It is not necessary for a physician to keep a copy of certificate issued by him/her. | 3.05 ± 0.36 | 3.47 ± 0.25 | 2.12 ± 0.19 | 3.64 ± 0.24 |
| 5. | Clinically confirmed cases should under laboratory investigation as routine. | 2.07 ± 0.30 | 2.15 ± 0.20 | 3.60 ± 0.21 | 1.88 ± 0.21 |
| | Total | 2.58 ± 0.33 | 2.87 ± 0.46 | 3.15 ± 0.58 | 3.07 ± 0.62 |

**Figure 1: Total score on attitude of medical student's, year wise**

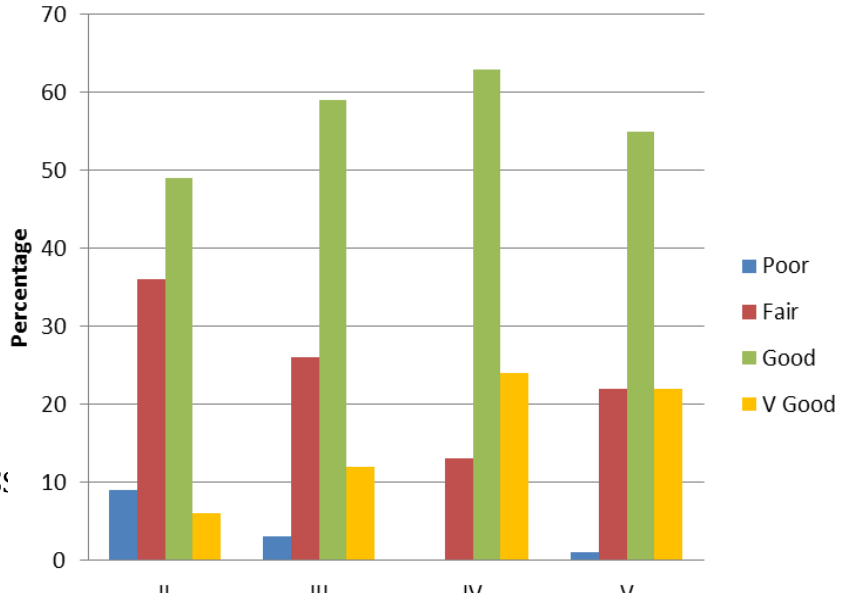
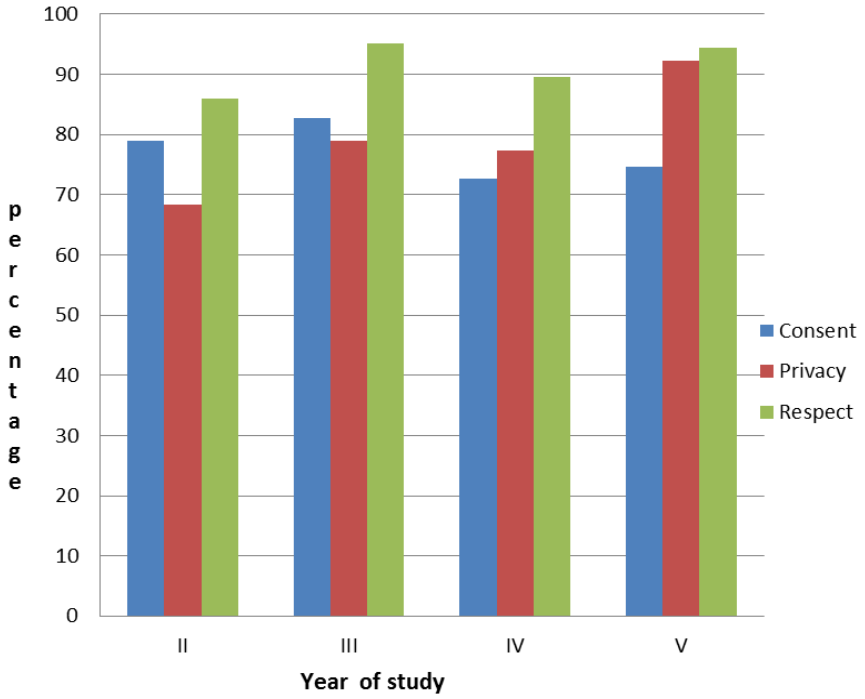


**Figure 2: Percentage of student's practice of medical ethics, year wise.**




lecture (45.07%).Same way preferred mode of teaching was clinical training(37.9%) followed by group discussion (31.04%).Only 21.9% of total student were aware of existence of institutional ethical committee but did not know its precise role in the college .

Table II: shows, on comparison of total attitudinal mean score of different batches exploring different areas of ethical issues in everyday practice increased correspondingly with increasing years of medical education. Final year students had maximum score of [3.33, 95% CI ± 0.39] followed by IV Year [3.32, 95% CI± 0.37], III Year [3.13, 95% CI± 0.39] and minimum for II year [2.99, 95% CI ± 0.35]

Table III shows, On comparison of mean attitudinal score regarding intimate examination, III years students had better score of[ 3.78, 95% CI± 0.46] followed by final year [3.74, 95% CI± 0.74] , IV Year[3.66, 95% CI± 0.76] and minimum score if II year students [3.00, 95% CI± 0.9].

Table IV shows mean score of knowledge of code of conduct of Tamil Nadu Medical council in which IV year students got the highest score [3.15, 95% CI± 0.58] and II year students got minimum score [2.58, 95% CI± 0.33].

Regarding total score achieved, nearly half of the students (57.6%) had good score [61-70] in which proportion of IV year students was maximum (63.2%).(Figure I)

Regarding practice of students during clinical posting maximum ( 82.7% )III Year students took informed consent of patients before taking history, privacy during examination was maintained by 89.6% of IV year students and



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regarding showing respect to the patient while examining him/her was followed maximally by III year students ( 95.06%) as given in Figure II

**Discussion**

Ethical conflicts are common during the initial years of medical professional career which makes induction of sound foundation in medical ethics essential. The response rate in present study was 89% therefore the results can be considered as representatives of awareness and opinion of medical students of Sree Balaji medical college in Chennai. In a study by Biswajit Chatterjee et al in west Bengal 31.1% were aware of importance of medical ethics similar as the result of present study (30.14%).[2]

In a study by Walrond E.R. etal in Barbados found that 60% students source of knowledge was clinical training and other 40% quoted lectures and seminar.[.9] In our study also the predominant source was clinical training(58.5%) and also preferred mode of teaching. As usual seniors like PGs /Doctors during clinical training play a role model for their juniors and also teach about better ethical conduct during practice to students.

In a study by L.W Roberts in 2004 among medical students at new Mexico found that respondents preferred clinical and expert oriented learning as conference and workshop involving multidisciplinary approach over the traditional Didactic approach.[10] In the present study only 21.9% of students were aware of existence of institutional ethical committee and had no idea about its role. This highlights the need for the administrative section of teaching hospital to publish their work at regular interval and also publish a report related to its involvement in different health related activities within the institution and circulate for the benefit of students.

On comparison of total attitudinal mean score of different batches exploring different areas of ethical issues in everyday practice increased correspondingly with increasing years of medical education. This suggest that didactic and textbook oriented teaching does not improve the knowledge of ethics and also the students considered best mode of learning was clinical approach.

On comparison of mean attitudinal score regarding intimate examination, III years students had better score of[ 3.78, 95% CI± 0.46]. Similar finding was shown in a study in West Bengal By Bishwajit et al where III year students had better mean score of 4.16± 0.28.[2] The situation does not appear to improve with increasing years and may even worsen as trainees progress through education as shown by many studies.[5,10]. A 3 year cohort study by Patenaude and others at the university of Sherbrook Medical School in Quebec, Canada, found that students understanding of ethics did not improve substantially with education.72% of students surveyed remained in the same stage of moral reasoning in their IIIrd year as in



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I[st] year as evidenced by mean score of 3.46 in I[st] year and 3.48 in III [rd] year. In fact 13% moved down to lower stage.[(5)]

Overall the study revealed that nearly half of the students (57.6%) had good score [61-70] and 22.3% students got fair score [51-60]. All the above finding of this study emphasizes the importance of continuing ethics education throughout undergraduate, internship and post graduate periods. Registered professional organizations like Indian Medical Association and Indian Public health Association should provide detailed guidelines on medical ethics in their journals to prepare future generations of medicos for ethically sound practice.

**Conclusion**

The results of the study highlight that medical students felt an inadequacy of knowledge of law as it pertains to their chosen career. Since most of their knowledge of law was obtained from Clinical training, these should be reviewed and proper avenues of tuition explored. To strengthen this awareness clinically oriented measures like case study, workshops etc should be conducted. This should be an ongoing process akin to medical education .Medical ethics should be part and parcel of every subject during their study in the institution. Students were also not aware of existence of institutional ethical committee and had no idea about its role. This highlights the need for the administrative section of teaching hospital to publish their work at regular interval and also publish a report related to its involvement in different health related activities within the institution and circulate it for the benefit of students. Registered professional organizations like Indian Medical Association and Indian Public health Association should provide detailed guidelines on medical ethics in their journals to prepare future generations of medicos for ethically sound practice.

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**Original Research Article**

# Prevalence of Hypertension and its epidemiological correlates – A cross sectional study among patients attending outpatient department of urban health center Srinagar Garhwal

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**Abstract**

**Background:** High blood pressure (BP) is a major public health problem in developing countries around the world and is one of the most important modifiable risk factor for cardiovascular diseases (CVDs).**Objectives**-To find out the prevalence of Hypertension and its correlate among study subjects. **Materials and Methods**: A Cross-sectional study was carried out among 292 individuals of 30 years and above, attending Out Patient Department (OPD) in Urban Health Center under the Department of Community Medicine, Government Medical College, Srinagar- Pauri Garhwal during June 2014-August 2014. A pretested predesigned questionnaire was used to collect demographic data by interview technique. Data was collected on socio-demographic and behavioral factors, and anthropometric measurements were carried out. Body mass index (BMI) Was categorized using the classification recommended for Asians. Waist circumference ≥90 cm for men and ≥80 cm for women was used cut off for defining an abdominal obesity. Chi squre test was applied to find out the association of hypertension with socio-demographic variables, personal habits, and obesity. The blood pressure was recorded and classified using JNC VII criteria to grade hypertension. Data was compiled, entered & analyzed using SPSS version 16.**Result**— The Prevalence of hypertension in the present study was 13%. Gender specific prevalence of hypertension was 12.8% for males and 13.2% for females. High BMI, increase salt intake, Central obesity, and high waist hip ratio were significantly associated risk factors. **Conclusions:** The risk factors as predicted in the study are modifiable. Health promotion, health education and behavior change communication can prove valuable tool for effective control.

**Key words**: Hypertension, risk factors, Hilly region

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## Introduction

Hypertension is an iceberg disease and can be described as the sleeping epidemic which will create havoc when it wakes up. Prevalence of hypertension is increasing in developing countries very rapidly and is said to be one of the most leading cause of mortality and morbidity among the elderly. Prevalence of hypertension in India, for the last three decades has increased by about 30 times among urban residents and by about 10 times among rural residents.[1] It has been predicted that by 2020, there would be a 111% increase in cardiovascular deaths in India.[2] As reported by World Health Organization, hypertension is the third 'killer' disease, accounting for 1 in every 8 deaths worldwide.[3] Analysis showed that about 26% of population globally is suffering from hypertension, and the prevalence is higher among developed as compared to developing countries.[4] It was

predicted that the number of adults with hypertension will increase by about 60% to a total of 1.56 billion (1.54-1.58 billion) by 2025.[5] Study carried out by Indian Council of Medical Research (ICMR) among Indian population during 1994 observed that the prevalence of hypertension was 29% and 25% among urban and 13% and 10% among rural men and women, respectively.[6] Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease (CHD) deaths in India.By the year 2020, non-communicable diseases such as cardiovascular diseases (CVD) will be the major causes of morbidity and mortality in developing countries, accounting for almost four times as many deaths as from communicable diseases. In 2020 AD, 2.6 million Indians are predicted to die due to coronary heart disease which constitutes 54.1 % of all CVD deaths. The situation in India is more alarming. This fact is important because hypertension is a controllable disease and a 2 mmHg population-wide decrease in BP can prevent 151,000 stroke and 153,000 coronary heart disease deaths in India[7].Eying over the increase burden of cardiovascular morbidity and mortality this study was plane to search out the various factor responsible to accelerate the hypertension in community of Garhwal region of Uttarakhand.

**Material and Method**

This cross sectional study was done over a period of three months (June 2014-August 2014) in a urban health center of community medicine, Garhwal, Uttarakhand. The sample size was calculated by using Formula (Robert V.KREJCIE et al)[8]

S =X2NP(1-P)÷d2(N—1) +X2P(1-P)

s= required sample size

N= Population size (1200)

p= Population proportion (0.50)

d= degree of accuracy

X2 = Table value of Chi square

. The sample size came out to be 292 of the individuals aged 30-75 years, coming to OPD were screened for the presence of hypertension.A person was included as study subject if he/she was under treatment for hypertensive illness or if systolic blood pressure was more than 140 or diastolic blood pressure more than 90 mm Hg or both as per Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) classification on the day of survey. All these cases were interviewed for various risk factors for hypertension on a semi structured questionnaire.

During the course of the interview, to avoid the biases two measurements of blood pressure in interval of thirty minute, in sitting position was measured with a mercury column sphygmomanometer. In case where the two readings differed by over 10 mm of Hg, a third reading was obtained, and the three measurements were averaged. Body Mass Index was calculated as weight in kilograms divided by height in meters squared. Based on their BMI, individuals were classified into four groups: Waist-hip Ratio -The cut off point for truncal obesity was defined as ≥0.9 for males & ≥0.8 for females as suggested for Asian ethnicity[9].

Blood Pressure was classified into four stages: Normal (SBP <120 mmHg and DBP <80 mmHg respectively), Pre-hypertension (SBP=120-139 and/or DBP= 80-89 mmHg), stage I hypertension (SBP=140-159 and/ or DBP=90-99 mmHg) and stage II hypertension (SBP= ≥160 and /or ≥100 mmHg) as per US Seventh Joint National Committee on Detection, Evaluation &

Treatment of Hypertension (JNC VII) criteria.[10] Patient with history of hypertension and taking treatment were labeled as hypertensive. Individual with thin build (BMI



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<18.5), normal (BMI=18.5-24.9), overweight (BMI = 25.0-29.9) and obese (BMI > 30.0)[11]. For measurement of height, interns were instructed to measure height when the patient, stand with the back against the wall and heels touching the ground, arms on the side and eyes in front parallel to ground. Distance between base of heel and edge of occipital was measured in cm with the help of standard measuring tape. Weight measurement was done taking standard criteria into consideration and recorded in kilograme. marked weighing machine which was adjusted to 'zero' weight while measuring it.A total of 292 individuals were screened. Data analysis has been done using SPSS version 16.0 and Microsoft Office Excel 2008. To test significance of correlates of hypertension chi square test have been used as applicable. All p values were two tailed and values of <0.05 were considered to indicate statistical significance.

Definitions :[12]

Smoker: A person who has been smoking at least a bidi or cigarette or any other form for at least six months before the start of study period.

Sedentary worker: Teacher, tailor, barber, priest, executive, peon, retired personnel, shoe maker, housewife, maid, nurse, doctor, clerk, shopkeeper, manager, goldsmith etc.

Moderate worker: Potter, basket maker, carpenter, mason, electrician, fitter, turner, driver, welder, fisherman, coolie, site supervisor, post man etc.

Heavy worker: Stone cutter, blacksmith, mine worker, wood cutter, farm laborer, army soldier etc.

Ethical considerations:Consent was taken from each participant coming to the OPD of UHTC . All entry forms were kept in the office of the Principal Investigator and completed questionnaires were only viewed by approved study personnel.

**Result**

Out of 292 respondents studied, 84 (28.7%) respondents were found pre hypertensive and 38 (13%) were found hypertensive as JNC VII criteria. (Table 1) .Out of them 46% was males and 54 % females. Among males, the prevalence was 12.6% and for females this figure was 13.2 %( Table 3). The mean blood pressure for males was 118.53+ 14.8/ 79.21+11.67 mm Hg and for females it was 110 + 16.9/78.45 + 8.35.mm Hg (table-2).

.The proportion of hypertension also showed an increasing trend with age. Prevalence of hypertension was significantly (P <0.05) higher among individuals aged 50 years and above as compared to those aged below 50years. Though the proportion of hypertension was higher among females (55.2%) as compared to males (44.8%), it was not statistically significant (P >0.05). 21 of the hypertensive were residing in urban areas and rest 17 belonged to rural communities. This relation was also non-significant on statistical analysis. Most of the illiterate subject were hypertensive than literate and above but statistically non-significant .contribution of marital status to Hypertension is also non-significant.

Significant differences (P <0.05) in the prevalence of hypertension were seen between respondents with a high BMI (52%) as compared to those with a normal or low BMI (48%), and among respondents with a high waist hip ratio (48%) as compared to those with a normal or low waist hip ratio (52%). Individuals who were using high salt intake, high central obesity and were found having higher prevalence of hypertension. This relation was significant on statistical analysis too. Although a higher proportion of respondents (14.45%) with a smoking habit were found hypertensive as compared to those who did not smoke (7.84%), difference was not statistically significant (P >0.05)



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Table 1 **Demographic Characteristic of Study Subjects** (n=369)

| Characteristics of Study Subjects Number | Number | Percentage | Hypertensive subject(n=38) | Test of significance (Chi Square) |
|---|---|---|---|---|
| Age | 30-39 | 52(18%) | 02 (5.26%) | 8.60 p =0.03 |
| | 40-49 | 58(20%) | 06( 15.7%) | |
| | 50-59 | 104(36%) | 12 (31.6%) | |
| | >60 | 78(26%) | 18 (47.3%) | |
| Sex | Male | 134(46) | 17(44.7%) | 0.02 p=0.82 |
| | Female | 158 (54) | 21(55.2%) | |
| Residence | Urban | 180(62%) | 21 | 0.57, p=0.44 |
| | Rural | 112(38%) | 17 | 2.23,p=0.56) |
| Education | illitrate | 70(24%) | 10 | |
| | Primary Middle | 100(34%) | 11 | |
| | Highschool Intermediate | 84(29%) | 9 | |
| | Graduate and above | 38(13%) | 8 | |
| Marital status | Married | 260(89%) | 34 | 1.18 p=0.93 |
| | Unmarried/divorced/Wido | 32(11%) | 04 | |

**Table-2Mean blood pressure in study population**

| Sex | Systolic BP (mm Hg) Mean ± SD | Diastolic BP(mm Hg) Mean±SD |
|---|---|---|
| Male | 118.53± 14.8 | 79.21±11.67 |
| Female | 110 ± 16.9 | 78.45 ± 8.35 |



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**Table 3: Gender wise distribution of respondents according to their blood pressures measured as per JNC-VII criteria report**

| Gender(n=292) | Normal | Pre-hypertensive | Stage1 | Stage 2 |
|---|---|---|---|---|
| Male (n=134) | 73(54.4%) | 44(34.8%) | 8(5.9%) | 9(6.7%) |
| Female(n=158) | 97(61.4%) | 40(25.3%) | 14(8.8%) | 7(4.4%) |
| Total=292 | 170(58.2%) | 84(28.7%) | 22(7.5%) | 16(5.5%) |

**Table 4 Hypertension in relation to modifiable risk factors:**

| Variables | Studyparticipants (n=292) | Number of Hypertensive (n=38) | Test of Significance Chi-square |
|---|---|---|---|
| BMI<br>Normal(≤24.9)<br>Overweight/obese(≥25) | 140(48%)<br>152(52%) | 10(26%)<br>28(74%) | 6.35<br>p=0.01 |
| Waist circumference<br>Normal<br>Central obesity | 180(62%)<br>112(38%) | 12(32%)<br>26(68%) | 11.53<br>p=0.001 |
| Waist Hip ratio<br>Normal<br>Increased | 170(58%)<br>122(42%) | 15(39%)<br>23(61%) | 4.79<br>p=0.02 |
| Tobacco/smoking use<br>Present<br>Absent | 103(35%)<br>189(65%) | 18(47%)<br>20(53%) | 2.12<br>p=0.12 |
| Salt intake Normal<br>Increase | 186(64%)<br>106(36%) | 12(32%)<br>26(68%) | 14.45<br>p=0.001 |
| Physical activity<br>Sedentary<br>Moderate<br>Heavy worker | 57<br>103<br>132 | 16<br>14<br>08 | 12.39<br>p=0.6 |



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**Discussion**

Hypertension and cardiovascular disease burden are increasing in India. The average prevalence of hypertension in India is 25% in urban and 10% in rural inhabitants.[13]Factors which are attributable to these changes are rapid urbanization, lifestyle changes, and dietary changes and increased life expectancy.[14]The finding of this study is consistent with the similar study[16,15] conducted previously in the hilly region of Uttarakhand had low prevalence of hypertension than that found in present study(13%).The prevalence of hypertension in this study was slightly higher among females compared to that in males but the difference was not statistically significant. Similar pattern, were seen in studies done by Parekh et al in Vadodara [17] and Mahmood et al in Bareilly[18] Hypertension was statistically significant with family history of hypertension and increasing BMI and similar findings were observed in studies done by Rajasekar et al [19] Saxena et al [15] and Rao et al [20].

The proportion of hypertension was found to increase steadily with the increase in age. These findings are coherent with study carried in rural Wardha[21].Increased waist circumference was significantly associated with hypertension and the same observation was reported by Rajasekar et al [19]and Rao et al [20].Increased waist hip ratio was significantly associated with hypertension in this study and the similar observation was reported in study done in Central India (Nagpur) by Kokiwar et al [14]. High proportions of respondents with a higher waist hip ratio were found hypertensive. Similar observations were reported in a study conducted in rural Wardha.[21]In present study smoking and other substance use is not significantly affecting the hypertension similar study conducted by Manimunda et al[22] who found no such association although prevalence of substance use was high in study population. Central obesity indicated by increased waist-hip ratio has been positively correlated with high blood pressure in several populations.[23] Increase salt intake found to be significantly associated with hypertension this finding is well supported by Gupta.M et all [24] and Ghosh et all [25] and Sexena et all.[15]

Physical inactivity was not found statistically associated with hypertension in this study and the similar findings was observed by Rajasekar et al [19] while the studies by Gupta SK et al [16] and Madhu et al[26] had a significant association between sedentary life style and hypertension.

Conclusion:

Prevalence of hypertension is lower in Garhwal region as compared to other studies across the nation. Risk factors like High BMI, increase salt consumption, central obesity and contribute significantly to the causation of hypertension. As this study is conducted at hilly area, but risk factor present in study is same as in other. It concludes that environment only cannot change the epidemiology of hypertension. Still they should be educated for the modifiable risk factor and and create awareness among them about hypertension.

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**Short Article**

# Screening of Type II Diabetes Mellitus on the Basis of IDRS Among Urban Population of Bhopal, Madhya Pradesh

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**Abstract**

**Background:** The prevalence of diabetes for all age groups worldwide was estimated to be 2.8% in 2000 which is projected to increase to 4.4% by 2030 , The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030 . India has highest number of estimated cases of diabetes for 2000 in 32 million and it will be 80 million in 2030 . IDRS is a cost effective and simple tool for screening of undiagnosed diabetic individuals at community. **Objectives:** To find out sensitivity and specificity of IDRS among urban population of Bhopal to validate IDRS as effective tool for diagnosis of diabetes. **Materials and methods:** This community based cross sectional study was carried out in urban catchment area of Gandhi Medical College , Bhopal among 350 subjects aged $\geq$ 20 in August – November 2010 by using predesigned questionnaire containing IDRS variables like age , physical activity , waist circumference and family history of diabetes. **Result:** In present study 46 out of 350 (13.1%) respondents were diagnosed to had newly diagnosed diabetes .We found that IDRS score 60 and above had the best sensitivity (75.5%) and specificity (58.7%) for detecting undiagnosed diabetes. **Conclusion:** We conclude that Indian Diabetes Risk Score is a useful tool for predicting and screening for undiagnosed diabetes mellitus in the community. This study validate it's sensitivity and specificity in urban area of Bhopal . IDRS was easy to use and cost effective tool for screening of type II diabetes in community .

**Key Word:** IDRS, sensitivity, specificity, Type II Diabetes Mellitus

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## Introduction

The term Diabetes Mellitus is described as metabolic disorder of multiple etiology, characterised by chronic hyperglycaemia with disturbance of carbohydrate fat and protein metabolism, resulting from defect in insulin secretion, insulin action or both. The effect of diabetes mellitus includes long term damage, dysfunction and failure of various organs [(1)].

The world health organisation (WHO) estimates that more than 180 million people worldwide have diabetes. These numbers will more than double over the next two decades, to reach a total of 366 million by 2030[(2)]. Most of these increases will occur as a result of a 150% rise in developing countries. It is estimated that the developing countries will bear the burnt of diabetes epidemic to the extent of 77% of the global burden in the 21st century [(4)].



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India had 32 million diabetic subjects in the year 2000 , 41 million in 2006 and this number would increase to 70 million by the year 2025 and 80 million by year 2030[2,3]. The recent WHO report suggest that over 19% of the world's diabetic population currently resides in India[2]. Unfortunately more than 50 % of the diabetic patients in India remain unaware of their status , which increases the risk of development of diabetic complications in them[7].

The type II DM has shown to affect younger age, affecting the health status of the country. This rising prevalence in the developing country is associated with industrialization and urbanization, indicating the role of not only genetic factors but also environmental factors like quality of life and life style.

The WHO collaborating centre for diabetes in India , Diabetes Research Centre (DRC) and MV Hospital Royapuram have taken major step in its diabetes prevention initiatives . The Centre announced the Indian Diabetes Risk Score (Table no. 1). It is a simplified risk score for identifying undiagnosed diabetic subjects using four simple parameters like age, waist circumference, family history of diabetes and physical activity[4].

## Objective

To find out the sensitivity and specificity of IDRS score among urban population of Bhopal district of Madhya Pradesh.

## Materials and methods

The study was community based cross sectional study. It was conducted in the ward no 2 Vijay Nagar, catchment area of Department of Community Medicine , Gandhi Medical College , Bhopal (M.P.) . The study period was August - November 2010.

The sample size included in the study was of 350 subjects. The sample size was calculated by taking 10% of total population above 20 years of age . The population of study area were 6130 and the reference population consisted of adult which form approximately 57% of total population that was 3495 . The 10% sample size had to be drawn from reference population of 3495 hence the total sample size comes out to be approximate 350 .

House to house survey was conducted and face to face interview were done by predesigned questionnaire which was based on IDRS variables. The selection of households was done by proper sampling interval. The sampling interval was every 4$^{th}$ house and the first house selected randomly and then one subject from each house till the desired sample size was achieved.

The subjects included in the study were adult age 20 years and above. One subject from each household was asked for their consent. They were divided into three age groups less than 35, 35-49 and more than 50 years. The data collected after informed consent subjects were selected and interviewed using the pretested questionnaires containing history of diabetic risk factors and IDRS variables. Unwilling and known case of type II diabetes were excluded from the study. All subjects were assessed for IDRS score which required answer to four simple questions and a waist circumference measurement.

The four questions are:-

1. What is your age?
2. Do you have a family history of diabetes? If yes, does your father or mother or both have diabetes?
3. Do you exercise regularly?
4. How physically demanding is your work (occupation)?

A score greater than 60 was given high risk for having diabetes, score between 30-50 was given moderate risk of having diabetes and



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score less than 30 was given low risk of having diabetes.

The subjects were given scores according to age, physical activity, family history of diabetes and waist circumference measurement. Waist was measured by using measuring tape. Measurement of the waist was taken directly on the body with light clothing with an accuracy of 0.5cm. The waist circumference was measured as the smallest horizontal girth between costal margins and the iliac crest at the end of normal expiration. After this the subjects with high IDRS score $\geq$ 60 were undergone for next step to assess random capillary blood glucose. The criteria used for random capillary blood glucose was $\geq$ 200 mg/dl. Third step was definitive test for diagnosis of diabetes by fasting blood capillary glucose $\geq$ 126 mg/dl and 2hour post load glucose $\geq$ 200 mg/dl.

Statistical analysis was done using "Epi info 3.5.4" software. Chi square test was used to study association of diabetes and risk factors like (family history and physical activity).

## Results

Out of 350 study subjects 46 (13.14%) had newly diagnosed type II diabetes mellitus. Table no. 2 shows sensitivity and specificity of Indian Diabetes Risk Score in undiagnosed diabetes subjects, in the study population. We found that IDRS score more than or equal to 60 has the best sensitivity (75.5%) and specificity (58.7%) for detecting diabetes mellitus in the community.

When the cut of value is taken as 50 and above the sensitivity rises (84.9%) and specificity reduces (36.5%) and when cut of

**Table. 1. Indian Diabetes Risk Score**

| Variables of IDRS | Detail | Score |
|---|---|---|
| Age | <35 | 0 |
| | 35-49 | 20 |
| | >50 | 30 |
| Abdominal obesity | Waist<80cm(female),<90 cm (male) | 0 |
| | Waist 80-89cm(female),90-99cm(male) | 10 |
| | Waist >90cm(female),>100cm (male) | 20 |
| Physical activity | Vigorous exercise or strenuous work | 0 |
| | Moderate exercise work/home | 10 |
| | Mild exercise work/home | 20 |
| | No exercise and sedentary work/home | 30 |
| Family History of diabetes | No family history | 0 |
| | Either parent | 10 |
| | Both parent | 20 |
| Maximum Score | | 100 |



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**Table No 2: Sensitivity and Specificity**

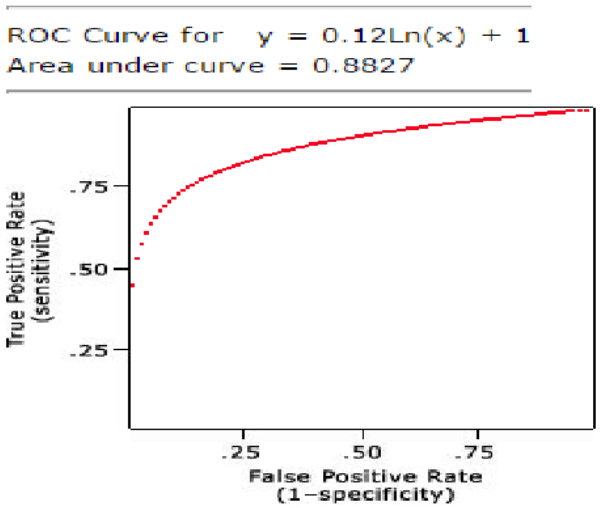
| IDRS | Urban area | | |
|---|---|---|---|
| | **Proportion of respondents** | **Sensitivity** | **Specificity** |
| ≥10 | 100 | 100 | 0.9 |
| ≥20 | 99.1 | 95.5 | 1.4 |
| ≥30 | 97.4 | 93.1 | 5.2 |
| ≥40 | 92.2 | 90.2 | 23.5 |
| ≥50 | 72.2 | 84.9 | 36.5 |
| ≥60 | 48 | 75.5 | 58.7 |
| ≥70 | 22.8 | 67.3 | 79.1 |
| ≥80 | 7.71 | 48.7 | 95 |
| ≥90 | 2.28 | 15.1 | 98.3 |
| ≥100 | 0.28 | 0.7 | 100 |

value is taken as 70 and above the sensitivity reduces (67.3%) and specificity rises (79.1%).
In the present study, the area under the ROC curve (Fig 1) was 0.88 in urban area. This shows that the score has better diagnostic accuracy in study area.
As a screening tool without compromising in sensitivity we can get optimal specificity at the cut of value of IDRS score 60 and above.

## Discussion

The study shows that IDRS consisting of four variables like age, waist circumference, physical activity and family history of diabetes mellitus with sensitivity 75.5% and specificity 58.7% when the score was 60 and above. In a similar study conducted by V.Mohan et al reported in their study an IDRS value 60 and above had the optimum sensitivity 72.5% and specificity 60.1% for determining diabetes[4]. Another study conducted by Adhikari et al reported in their study for IDRS score 60 and above

**Fig.1.ROC Curve**




sensitivity 62.2% and specificity 73.7% for predicting diabetes in community[5]. Vikram V Shanbhogue et al in their study reported that the IDRS score used to predict risk of developing diabetes in general population has sensitivity of 72.5% and specificity of 61.3% [8].

There were no remarkable differences in previous study. This study provides a use of simplified IDRS score for identifying high risk for diabetic subjects in a community. Simplified diabetes risk score has categorized the risk factors based on their degree of severity. Mass screening of high risk cases for diabetes can be made cost effective with regular use of IDRS.
IDRS score does not require any trained medical staff to collect the data. It can be done even by a layman since it involves collection of data like age, family history of diabetes physical activity and waist circumference. Screening and early identification of high risk individuals would help to take appropriate intervention like life style modification. It would help to prevent or to delay the onset of diabetes mellitus.
This study reports on a simplified Indian Diabetes Risk Score for identifying newly diagnosed diabetic subjects. This is a great



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significance as use of such scoring system could prove to be a cost effective tool for screening of diabetes. Further, use of such a risk score would be of great help in developing countries like India where there is a marked explosion of diabetes and over half of the cases remain undiagnosed.

**Conclusion**

Our study shows that IDRS score is simple, easily administered, economical and effective tool for screening of type II diabetes in a community. The IDRS score helps to identify the undiagnosed diabetes individuals from the community.

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**Conflict of Interest:** None declared

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