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RESEARCH - THE TOOL FOR PROGRESS

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Evidence based medicine and innovations in medical management have been possible due to continuous research and active participation of researchers. New insights in the field of medicine have been due to the result of continuous efforts and hard work to make human lives better. The benefits are there in the form of new knowledge, drugs, medical instruments and devices. Experimental or basic medical research in the field of genetics, or clinical research in applied medicine has made many treatment modalities affordable to the common man especially for the underprivileged.1

Research in India is in quite promising stage, despite all the odds, it is under transformation. Research, especially in medicine plays a very crucial role in the growth of a healthy nation. With the right kind of attention, a great potential of human resource in India can be utilized for innovative research. Government of India has set up a separate department of ‘health and research’ to promote research in the country.2

In India, there have never been an emphasis on research at primary education level or at higher educational level. Regulatory bodies of medical education also have not included research as a separate subject or developed a separate department in medical colleges, with the result doctors who pass MBBS have no training in research and they mainly join the provincial medical services for community health care. The teachers also in medical colleges lacked the instinct for research and spent their time for teaching and patient care. PhD in medical fields has not been very popular in medical colleges or even in institutes of higher learning, in contrast to developed countries. The rules that teachers have to write papers for their promotions has put pressure on teachers who are already burdened with undergraduate, postgraduate teaching and patient care. This has resulted in a mushrooming of many sites who publish poor quality papers on premium. The role of teachers in medical colleges has changed and they are expected to be well versed with information & technology skills in addition to regular teaching and patient care.3

Unfortunately, we try to follow the developed countries without creating proper infrastructure and culture for the same. Research therefore, requires a dedicated faculty who can generate new ideas, a strong infrastructure, and financial support, with open than bureaucratic approach. It is a full time job and therefore requires separate dedicated institutes, departments with faculty who has an inclination for research to make a difference globally. Absence of research culture is a major barrier in promoting the research in medical colleges. Postgraduates in medical college submit thesis as a requirement for partial fulfillment of P.G. degree, where plagiarism is rampant and needs to be curbed. Research has to be a continuous process beyond the limitations of the classroom. Every society has its needs and accordingly the area of research should be innovative and students should have the freedom to choose the area of research. Unfortunately, number of students opting for basic research is declining due to lack of basic infrastructure, lack of grants, and career opportunities.4

Quality research needs high level funding, trained faculty and staff, and dedicated teams for long term results. Around the globe, two percent of industry turnover goes to research development activities, however in our country the contribution of industry for research is bare minimum and funding is mainly done by government agencies like Indian Council of Medical Research, Department of Biotechnology, Science and Technology etc. Funding mainly is distributed to centrally situated research institutes because of methodology used for distribution of funds and poor writing skills of the researchers in other peripheral institutes. ICMR promotes biomedical research in the country through intramural as well as extramural research funds. Over the decades, the base of extramural research and also its strategies have been expanded by the Council for other centers, without expanding the provision of training in writing grants and availability of research infrastructure.5

There is a need to have a central body of researchers who should be associated with different medical colleges in a region wise or state wise manner to help making multicentric projects based on the needs and priorities of the country or the region. The contribution of India as a country, in the terms of scientific research, is bare minimal to 1.2 percent, which can be substantially increased by innovative steps. Research is a tool for progress for any country and country must take steps for catching young researchers on the line of other sports bodies.
by providing them lucrative careers. Medical council of India is encouraging the medical students and teachers to do research, without ensuring sufficient infrastructure, manpower, and funds. For making research as an alternative tool for progress, there is a need for diverse teams as collaborators, for making the dream come true.

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PREVALENCE OF ELEVATED HEPATIC ENZYMES AMONG NORTH INDIAN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT
This study was planned to evaluate the liver function in patients with type 2 diabetes mellitus by measuring bilirubin (total and direct), aspartate aminotransferase (AST), alanine aminotransferase (ALT), gamma glutamyl transpeptidase (GGT), total protein, albumin and glycosylated hemoglobin (HBA1c). The study was carried out in Santosh Medical College & Hospital, Ghaziabad. 100 patients with type 2 diabetes mellitus (49 males and 51 females) were included in the study. Their ages ranged between 32 and 55 years. Hundred matched normal individuals were taken as control group. In the present study, we concluded that the mean values of ALT, AST and GGT were significantly higher in patients as compared to the controls (P<0.05). Total protein and albumin concentrations in patients were lower as compared to the control group (P<0.05). The mean of serum glucose and glycosylated hemoglobin concentrations in patients revealed significant difference (P<0.001) as compared to the control group.

Keywords: Type 2 Diabetes Mellitus, liver function test, glycosylated hemoglobin.

INTRODUCTION
Diabetes is one of the major non-communicable diseases, whose prevalence is increasing exponentially. Globally, Type 2 Diabetes Mellitus is the most common form accounting for about 90% of all the cases. There exists an association between diabetes and liver injury as diabetes mellitus is known to be associated with a number of liver disorders, including isolated elevation of liver enzyme levels, nonalcoholic fatty liver disease (NAFLD), and other chronic liver disorders like hepatitis C infection (HCV) and cirrhosis. The liver has a central role in glucose homeostasis in the fasting and post prandial concentrations and in liver diseases, this hepatic carbohydrate metabolism is generally altered.

As shown in animal models, chronic hyperinsulinemia state predisposes liver to relative insulin resistance. Also, a cascade of reactions leading to increased lipogenesis and associated fatty changes. The excess in free fatty acid concentration found in this insulin resistant state is known to be directly toxic to hepatocytes which include suggestive mechanisms of cell membrane disruption at high concentration, mitochondrial dysfunction, oxidative stress from reactive lipid peroxidation and an increase in pro inflammatory cytokine such as Tumor Necrosis Factor, which also contribute to hepatocellular injury.

There is evidence that the disturbance in hepatic glucose metabolism may be involved in the pathogenesis of Type 2 Diabetes Mellitus. It is stated that the disturbances in liver function tests are well recognized in some diabetic patients. Increased activities of liver enzymes such as Alanine transaminase (ALT), Aspartate transaminase (AST) and Gamma glutamyl transferase (GGT) which are indicators of hepatocellular injury, are associated with insulin resistance and Type 2 Diabetes Mellitus.

It was found in a study of 35 patients that HBA1c results should be used in patients with advanced liver disease when evaluating long term glucose control in such patients. Further, increased levels of ALT, AST and GGT are known to be markers of nonalcoholic fatty liver disease (NAFLD). There is increased prevalence of NAFLD in the Diabetes Mellitus and it is regarded as a predisposing factor for insulin resistance and hyperinsulinemia. The present study is aimed to evaluate the prevalence of elevated hepatic enzymes among North Indian patients with Type 2 Diabetes Mellitus as compared to the non-diabetic control group.

MATERIALS AND METHODS
This is a hospital based study conducted in the Department of Biochemistry and Central Laboratory, Santosh Medical College, Ghaziabad. Patients were taken from medicine OPD. Ethical consideration of the study was approved by the Institution’s Ethical Committee. The objectives and detailed procedure involved in the study were explained to all the eligible subjects. Written informed consent forms were obtained from all the participants of the study. Specimen collection: 100 new type 2 diabetic patients were recruited for the study, by random selection. They were distributed into 2 groups as x males and y females.

For the control group, 100 samples, which constitute x males and y females, non-diabetics, aged between 32 to 55 years were voluntarily included in the study.
Patients selected for the study were selected according to the ADA-2010 criteria.

**Excluded criteria of subjects:**
1. History of alcohol consumption.
2. Patients taking hepatotoxic drugs like amidarone, antituberculous drugs.
3. Pregnant women.
4. History of liver disease including clinical or biochemical evidence of acute hepatitis, autoimmune hepatitis, primary liver cirrhosis, hemochromatosis or Wilson disease.
5. Subjects with positive hepatitis B and C virus infection (seropositive for HBsAg and HCV antibodies).

**Blood sample collection:** 5ml of venous blood was drawn from each subject in fasting state using disposable syringe and immediately transferred to plain tubes for further sample processing. Also, 2ml venous blood was drawn from each subject for the Post prandial blood glucose measurement. The samples were analyzed for ALT, AST, GGT, Alkaline Phosphatase [to measure the quantitative determination of the catalytic enzyme activity, supplied by Merck Diagnostics], Bilirubin (total & direct), Total protein, albumin, fasting blood glucose, post prandial blood glucose [using the Enzymatic Colometric method supplied by Merck Diagnostics] and glycosylated hemoglobin [using Immunoturbidimetric inhibition method by Aggape Diagnostics].

**STATISTICS**
The data obtained was analyzed using GRAPH PAD PRISM (Version 5.0). Unpaired t-test was used to compare controls & patients. P value less than 0.05 was taken as significant. Results are expressed as mean±S.D.

**RESULTS**
The mean values of age in control were 45.6±5.2 & patients 47±3.8. The patients were age & sex matched. In the current study, Table 1 shows comparison of controls with patients of altered liver function with cases of Type 2 diabetes mellitus in which we compared ALT, AST, GGT, albumin ,total protein, bilirubin( total and direct) & Table-2 depicts Blood sugar (fasting and post- prandial) and HBA1c in the same. As shown in Table 1, mean values of ALT, AST and GGT liver enzymes were significantly higher in type 2 diabetic patients than in the control group (P≤0.05). In contrast, values of total protein and albumin concentrations were significantly lower in diabetic cases as compared to the control group (P≤0.05). The mean value of serum glucose & HBA1c is clearly higher in diabetic patients than in controls (P<0.001).

**Table 1: Shows comparison of controls with patients of altered liver functions**

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<th>Parameters</th>
<th>Controls</th>
<th>Patients</th>
<th>P value</th>
</tr>
</thead>
<tbody>
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<td>Albumin</td>
<td>3.868 ± 0.07485</td>
<td>3.383 ± 0.09744</td>
<td>0.0002</td>
</tr>
<tr>
<td>Total Protein</td>
<td>6.842 ± 0.1005</td>
<td>6.078 ± 0.1149</td>
<td>0.0001</td>
</tr>
<tr>
<td>Globulin</td>
<td>2.997 ± 0.07829</td>
<td>2.757 ± 0.09793</td>
<td>0.0613</td>
</tr>
<tr>
<td>Bilirubin(T)</td>
<td>0.8065 ± 0.02421</td>
<td>2.034 ± 0.5710</td>
<td>0.0366</td>
</tr>
<tr>
<td>Bilirubin(D)</td>
<td>1.223 ± 0.8713</td>
<td>0.9192 ± 0.2799</td>
<td>0.7416</td>
</tr>
<tr>
<td>GGTP</td>
<td>32.04 ± 1.958</td>
<td>62.38 ± 15.51</td>
<td>0.0579</td>
</tr>
<tr>
<td>SGOT</td>
<td>24.00 ± 1.470</td>
<td>148.3 ± 38.68</td>
<td>0.0023</td>
</tr>
<tr>
<td>SGPT</td>
<td>25.46 ± 0.9531</td>
<td>196.2 ± 64.31</td>
<td>0.0106</td>
</tr>
<tr>
<td>Alkaline Phosphatase</td>
<td>131.0 ± 8.905</td>
<td>293.2 ± 42.54</td>
<td>0.0005</td>
</tr>
</tbody>
</table>

**Table 2: Shows comparison of controls with patients for Blood sugar parameters**

<table>
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<th>Parameters</th>
<th>Controls</th>
<th>Patients</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting Blood sugar (F)</td>
<td>90.82 ± 2.716</td>
<td>133.8 ± 7.569</td>
<td>0.0001</td>
</tr>
<tr>
<td>Post prandial Blood Sugar(PP)</td>
<td>123.0 ± 2.537</td>
<td>209.4 ± 11.92</td>
<td>0.0001</td>
</tr>
<tr>
<td>HBA1c</td>
<td>5.00±0.14</td>
<td>9.8±0.35</td>
<td>0.0001</td>
</tr>
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</table>
DISCUSSION

Several serum enzymes have been studied in diabetic patients, but the data reported are often unrelated and controversial. In this study, we have studied many sensitive LFTs & there variation in diabetic patients. Previous studies have demonstrated that a high prevalence of unexplained altered liver enzymes (ALE) has been found in Western populations. In an earlier study, which included 175 unselected Finnish patients with type 1 and type 2 diabetes, Salmela et al reported that the prevalence of higher ALE was 57% and glycosylated haemoglobin was averaged at 11.2±2.4%. One recent study has confirmed the high prevalence of ALE in patients with type 2 diabetes mellitus, with rates ranging from 15-30%. In this study, the most frequently encountered abnormalities were those of SGOT, SGPT and ALP, rather than GGT. The few available reports have highlighted ALP as the most frequent abnormality in subjects with type 2 diabetes mellitus. However, this is not a universal finding and transaminase abnormalities have been shown to be the most common abnormality in some studies, higher transaminases would be more suggestive that NAFLD is the probable cause in such patients. Meltzer and Everhart noted a greater prevalence of abnormal alanine aminotransferase levels among Mexican Americans with diabetes and disagree with the study of Erbey et al. In their study, 4.1% had elevated ALT. Those with type 2 diabetes, had prevalence of elevated ALT which was 7.8% as compared to 3.8% prevalence in those without diabetes. A data of 10,065 patients was investigated for the correlation between HBA1c and plasma glucose in patients with different levels of increased liver enzyme concentrations and it was found that the correlation between HBA1c and plasma glucose was high in all groups with r=0.77 (in males) and r= 0.78 (in females) (p< 0.001).

Many factors linked to diabetes per se or to associated disorders or treatment regimens may affect LFT results in diabetic patients. Complications and enzymatic adaptations due to long-term diabetes result in increases in serum enzymes that are not directly linked to liver damage. Such mechanisms could explain the poor correlations between the histologic findings and the values of serum ALP and Bilirubin in the IDDM patients with normal livers. LFTs are not sufficiently reliable to correctly and consistently identify the presence of those histologic alterations that could represent intermediary steps in the progression of fatty liver to hepatic cirrhosis. Many studies showed that younger diabetic patients were more likely to have high ALT values than the older patients. However, the older patients showed elevated AST activity and ALT elevation was found to be more common in men than to women. It was also stated that there is a significant association of elevated ALT levels with the duration of diabetes. Other risk factors for elevated ALT were younger age and larger waist circumference. Patients on insulin appeared to have lower ALT readings. These findings necessitate interference by lifestyle modification and early therapeutic measures to control risk factors, especially obesity, in younger diabetics which might help to prevent chronic liver disease.

Supported by earlier studies this finding suggested that severe steatosis denoted by a higher release of the ALT enzyme in response to hepatocytes derangement, tends to occur earlier in the disease process. As a marker of hepatocyte integrity the ALT activity decreases as steatosis progresses whereas inversely a rise in the AST level has been noticed in the older patients. The latter observation can be attributed to the fact that the clearance of this enzyme is mainly accomplished by the liver sinusoidal cells. While there is no effect from the necroinflammatory activity on AST level, advancing fibrosis which injures the sinusoidal cells leads to the relative increase in serum AST. In a study by West J et al it was reported that the prevalence of elevated ALT is 3-4 times higher in patients with either type 1 or type 2 diabetes mellitus than in the general population.

CONCLUSION

The results of this study are in accordance with previously reported high prevalence rates of ALE in patients with type 2 diabetes mellitus in other populations. Raised ALT and AST are more common among the diabetes patients as compared to controls. AST elevation was also significant among men. Abnormal liver function tests among diabetes patients can be indicator of associated non alcoholic fatty liver disease. There has been a direct correlation between HBA1c and elevated liver enzymes, in accordance with previous studies. Checking for liver enzymes, ALT and AST should be carried out to screen the possibility of underlying fatty liver, which might need further evaluation and early intervention to prevent from progression into cirrhosis and chronic liver disease, especially in male patients with Diabetes & high BMI.

Although there are currently no consensus guidelines or recommendations regarding LFT screening in patients with type 2 diabetes mellitus, these findings lend support to the practice of routine liver function monitoring in subjects with type 2 diabetes mellitus.

Furthermore, the high prevalence of severe derangements also highlights the importance of performing LFTs in these otherwise asymptomatic patients, as they may harbor potentially treatable co-morbid illnesses. Many of these patients would
require further laboratory, radiological and histological investigation.

Therefore, if LFT screening is to be adopted, it would be incumbent on the physician to ensure that abnormal findings are appropriately investigated, or that the patient be timorously referred to a tertiary institution with the necessary facilities.

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ORIGINAL RESEARCH

THE ANATOMY OF SMILE IN HARYANAVI FEMALES

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ABSTRACT
Facial Aesthetics is a primary consideration for the patients seeking prosthodontic and orthodontic treatments. The present study was conducted on 50 females age group 18-25 years in Pt. B.D. Sharma Post graduate institute of Medical Sciences, Rohtak. The photographs were clicked with the digital camera with high resolution. The maximum number of teeth exposed during full smile was 10 in 52% followed by 12-16 in 32%, 8 in 14% and 6 in 2% cases, the midline relationship of central incisors to philtrum was central in 48% followed by right of the center in 44% and left of the center in 8% cases, bilateral negative space was normal in 76% followed by increased space in 24% cases.

Keywords: Smile, Prosthodontic, Orthodontics, Aesthetics

INTRODUCTION
Dentofacial attractiveness is a major determinant of overall physical attractiveness. Individuals mainly focus on other people's eyes and mouths during interpersonal interaction, with little time spent on other facial features. In the mind of the general public, the smile ranks second only to the eyes as the most important feature in facial attractiveness. The anatomy of the smile is an integral part of dentistry. Its understanding involves close scrutiny of all elements of the oral region. Smile should be analyzed from the frontal view to achieve the goals of symmetrically framing the teeth with the lips and harmonizing the teeth, gingiva, negative space, and lips. To create a harmonious smile the dentist must maintain or create the normal curvature of the lips, proper exposure of the red zone of the lips, an undistorted philtrum, and undisturbed nasolabial grooves. The lips are the frame, the teeth are the main subjects, and the gingiva is the background. These entities, maintained in harmony with the exposed teeth, constitute the anatomy of a smile. In other words, being able to interpret the nuances of a smile gives each orthodontist the opportunity to act in a conscious manner in the mouth aesthetic treatment of their patients, allowing the diagnosis to be integrated with the prognosis and giving a realistic outlook of the results that can be obtained. In order that patients may be served properly, the smile must be understood, recorded, and analyzed so that desirable aspects may be preserved and graceless components returned to attractiveness.

MATERIALS AND METHOD
The study was conducted on 50 females age group 18-25 years in Pt. B.D. Sharma Post graduate institute of Medical Sciences, Rohtak. The methods and objectives were explained to them and written consent was obtained for willful participation in the study. Following inclusion and exclusion criteria were used for selection of the subjects.

Inclusion criteria: The subjects having full dentition were included. However, the eruption of last molar was ignored in the subject as its eruption is variable and is not a dependable criterion.

Exclusion criteria:
   a) Subjects with deformity, injury, trauma, malformation, surgical scar and congenital abnormalities of the lips were excluded.
   b) Subjects who have migrated into Haryana from other places were excluded.

The photographs were clicked with the digital camera with high resolution. The following parameters of smile were studied.

1) Number of teeth exposed during full smile: The number of teeth displayed in smile was as follows:
   I. Six anterior teeth exposed (canine to canine)
   II. Eight anterior teeth exposed (Six anterior teeth and first premolar)
   III. Ten anterior teeth exposed (Six anterior teeth, first and second premolar)
   IV. Twelve-sixteen anterior teeth exposed (Six anterior teeth, first and second premolar, and first molar)

2) Midline Relation of central incisors to philtrum [fig. 1]: A midline is an imaginary line that runs from the midpoint of the nose base, and through philtrum or the midpoint of the arch in the upper lip through the center of central incisors. It may pass right or left
of central incisor. To attain optimal aesthetics, the facial midline must coincide with the maxillary and mandibular central incisor midline. A properly placed midline in conjunction with a long solid inter proximal contact relationship between two central incisors produces a desirable effect of “cohesiveness” of the dental composition. The facial midline is a critical reference position for determining multiple design criteria, in orthodontic treatment planning, as it is an important functional component of occlusion.

3) Bilateral negative space (BCs) [Fig.2]: As the smile expands, the lips separate, the commissures curve upwards, and the teeth are exposed. Buccal corridors or the negative space is the space created between the buccal surface of the posterior teeth and lip corners when the patient smiles. As small BCs make a smile more attractive, orthodontic expansion has been proposed to improve smile attractiveness. This smile feature has been thought of primarily in terms of maxillary width, but there is evidence that the buccal corridors are also heavily influenced by the anteroposterior position of the maxilla relative to the lip drape.

RESULTS
The result of this experiment showed the following characteristics of smile in Haryanavis (Table 1):

I. The center midline relation of central incisors to philtrum was maximum followed by midline passing through right of center while it was rarely passing through left side of the philtrum.

II. The number of teeth exposed during full smile was 10 teeth (Six anterior teeth, first and second premolar) in 52% cases followed by 12 teeth in 32% cases.

III. The Bilateral negative space was normal in 76% cases followed by increased space in 24% cases.

DISCUSSION
In the present study, the most common midline relationship of central incisors to philtrum was centrally placed (48%) followed by right of the center (44%) and left of the center (8%) [Table 2]. In North Indian females about more than 3/4th females have central relation of central incisors to philtrum while in Haryanavi females this percentage is less than 50% cases. The harmonious relationship of central incisors with the philtrum imparts a desirable effect of “oneness” of dental composition to the smile of Haryanavis.

In the present study, maximum number of teeth exposed during full smile was 10 (52%) followed by 12-16 in 32%, 8 teeth in 14% and 6 teeth in 2% cases [Table 3]. Our study did not follow the trend with Tjan et al's study conducted in American population. He reported that maximum number of teeth exposed were 8 in 48.6% followed by 10 teeth (40.65%) and 12-16 teeth in 3.74% cases. The study on North Indian population conducted by Patnaik & Goel showed that maximum number of teeth exposed during full smile was 8 in 69.67% followed by 6 in 21.29% and 10 teeth in 9.03% cases. The different results of the above studies could be explained on genetic basis.

Sabri reported that those young subjects displaying the first molars during full smile were ranked highest esthetically. Only 80% of the maxillary incisor was exposed on smile, and with further maturation and aging, this amount was expected to decrease. Therefore, the lack of incisor show was considered both an initial esthetic problem and a long-term problem because it was expected to worsen with further growth and maturation.

The present study revealed that the bilateral negative space was normal in 76% cases and increased in 24% cases [Table 4]. The bilateral negative space was normal in 93.54% cases in the study on north Indian females by Patnaik & Goel. Importantly, Moore et al provided the data regarding smile. He demonstrates that broader smiles with no buccal corridors (BCs) are more attractive than smiles with BCs. This indicates that both orthodontists and laypeople prefer smiles with no or small BCs over those with large BCs. This is in agreement with the opinion of Sarver and Ackerman that small BCs are more attractive. But, the orthodontist’s eye for beauty is an important factor in creating appropriately sized buccal corridors.
The smile is one of the most important facial expressions and should be carefully analyzed as a whole before the accomplishment of dental treatment, aiming to establish the harmony between the teeth and adjacent soft tissues, achieving an esthetic and pleasant smile. Evaluation of the face should be conducted together with the intraoral examination for the establishment of treatment goals that may meet the patient’s expectations and reestablish the most

Table 1: Showing percentage frequency of different parameters of smile in Haryanavi females

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Positions</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midline relation of central incisors to philtrum</td>
<td>Center</td>
<td>24</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>Right of Center</td>
<td>22</td>
<td>44%</td>
</tr>
<tr>
<td></td>
<td>Left of Center</td>
<td>4</td>
<td>8%</td>
</tr>
<tr>
<td>Number of Teeth exposed during full smile</td>
<td>6</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>7</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>26</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>16</td>
<td>32%</td>
</tr>
<tr>
<td>Bilateral negative space</td>
<td>Normal</td>
<td>38</td>
<td>76%</td>
</tr>
<tr>
<td></td>
<td>Increase</td>
<td>12</td>
<td>24%</td>
</tr>
</tbody>
</table>

Table 2: Showing comparison of midline relationship of central incisors to philtrum in North-Indian and Haryanavi females

<table>
<thead>
<tr>
<th>Authors</th>
<th>Region</th>
<th>Midline Relation of central incisors to philtrum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patnaik &amp; Goel (2010)²</td>
<td>North India</td>
<td>76.77% 1.29% 21.93%</td>
</tr>
<tr>
<td>Present Study (2013)</td>
<td>Haryana</td>
<td>48% 44% 8%</td>
</tr>
</tbody>
</table>

Table 3: Showing number of teeth exposed during full smile in different studies

<table>
<thead>
<tr>
<th>Authors</th>
<th>Region</th>
<th>Number of teeth exposed during full smile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tjan et al (1984)⁶</td>
<td>California(USA)</td>
<td>7.01% 48.6% 40.65% 3.74</td>
</tr>
<tr>
<td>Patnaik &amp; Goel (2010)²</td>
<td>North India</td>
<td>21.29% 69.67% 9.03%</td>
</tr>
<tr>
<td>Present Study (2013)</td>
<td>Haryana</td>
<td>2% 14% 52% 32%</td>
</tr>
</tbody>
</table>

Table 4: Showing Bilateral negative space in North-Indian and Haryanavi females

<table>
<thead>
<tr>
<th>Authors</th>
<th>Region</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patnaik &amp; Goel (2010)²</td>
<td>North India</td>
<td>93.54% 6.46%</td>
</tr>
<tr>
<td>Present Study (2013)</td>
<td>Haryana</td>
<td>76% 24%</td>
</tr>
</tbody>
</table>

CONCLUSIONS

The smile is one of the most important facial expressions and should be carefully analyzed as a whole before the accomplishment of dental treatment, aiming to establish the harmony between the teeth and adjacent soft tissues, achieving an esthetic and pleasant smile. Evaluation of the face should be conducted together with the intraoral examination for the establishment of treatment goals that may meet the patient’s expectations and reestablish the most
esthetic conditions as possible. People with normal dental appearance are judged socially more attractive over than those with malocclusions. An attractive smile has always been the focal point of a person's attention to improving esthetic appearance and thus self-esteem. Therefore, it is essential that the clinician has a comprehensive knowledge of the elements and basic principles of aesthetics and the specific characteristics of the individual's teeth. This study may provide useful data which may allow the orthodontist to systematically and consistently deliver high-quality, stable results with beautiful smiles in Haryanavi females. The present study is a baseline data for normalcy of an esthetic smile in Haryanavi females.

REFERENCES
DERMATOGLYPHICS AND ORAL CANCER – ARE THEY RELATED?
Geeta Sharma, Randhir Singh*, Manu Gupta, Manish Gupta, Shalabh Srivastava, Aman Chowdhary
Santosh Dental College and Hospital Ghaziabad

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E-mail drrandhirmds@gmail.com

ABSTRACT
Dermatoglyphics is the study of epidermal ridges on the palmar and plantar surfaces1. After their complete formation, they are unaffected by the environment. This property works as an ideal marker for individual identification as well as detection of defects due to intrauterine irregularities in the early weeks of pregnancy. Oral cancer is one of the 10 leading cancers in the world and is amongst the most frequent cancer in India. Genetically determined susceptibility is the most important etiology for oral cancer. This present study is conducted to analyse the dermatoglyphic patterns in oral cancer patient.

The participants were divided into two groups- 100 normal and 100 cancer patient without any known etiology. A thin layer of black printing ink material was applied to finger and palm. Imprints of 5 finger tips were recorded in specified boxes and entire palm imprints were recorded in the middle of the A4 sheets. The difference in the distribution of thenar crease, distal crease and ATD angle is found to be highly significant in oral cancer patient as compared to normal individual loops were also found to be increased in oral cancer.

Keywords: Dermatoglyphics, dermal patterns, distal crease, ATD angle, thenar crease.

INTRODUCTION
Cummins and Midlo (1926) were the first to coin the term ‘DERMATOGLYPHICS’2. It is the science and art of the study of surface markings of the skin, especially feet and hands. (DERM= Skin, GLYPH= Carving)

Over the past 150 years, dermatoglyphics has been a useful tool in understanding basic questions in biology, Medicare genetics and evolution, in addition to being the best and most widely used method for personal identification.

Engler3 (1982), in his dermatoglyphics study on breast cancer patients revealed two genes BRCA-1 and BRCA-2 on the q arm of chromosome no. 17 at the 36th position. Dr. Stowens, chief of pathology at St. Luke hospital in Newyork, claims to diagnose Schizophorenia and Leukemia with 90% accuracy from pattern of hand alone

MATERIALS AND METHOD
A cross-sectional study design was conducted and a sample of one hundred patient with squamous cell carcinoma and one hundred normal individual is taken. The patient with cut and wound in the hand are excluded from the study.

The materials used in the study were the basic diagnostic instruments for examination and detection of squamous cell carcinoma. For recording the palm print, ink pad, magnifying glass and white sheets of paper were used.

The study initiated after obtaining approval from institutional ethics committee. Patient’s consent was taken before taking the palmer and plantar impression. All the diagnosed cases of squamous cell carcinoma coming to the department of oral pathology were examined.

Recording of finger-tip pattern
Subject hands were cleaned and dried before printing. A thin layer of printing ink was applied to the fingers and palms using black printing ink. Imprints of 5 fingertip were recorded in specified boxes and entire palm imprint was recorded in the middle of A4 sheet. The same procedure was repeated in relation to other hand. Prints were dried and studying using a magnifying lens to identify the finger and palm pattern. After taking the fingerprints of all fingers and palm, ink was removed by using oil, soap and water.

Evaluation of fingertip pattern configurations:
Galton divided the ridge patterns on the distal phalanges of the fingertips into 3 groups. Arches, Loops and Whorls. Although numerous sub classifications have been subsequently offered, this simple classification is still recognized and used by majority of investigators today*. (Fig. 1)

1. Arches is the simplest pattern found on fingertips. It is formed by succession of more or less parallel ridges, which traverse the pattern area and form a curve that is concave proximal. The arch pattern is subdivided into two types. 1. Simple arch or plain arch & 2. Tent arch. The point of confluence is called a triradius, because ridge usually radiate from this point in three different directions

2. Loops the most common pattern on the fingertip. A series of ridges enter the pattern area on one side of the digit, recurve abruptly and leave the pattern area on the same side. If the ridge open on ulnar side, resulting loop is termed as ulnar loop. If the ridge opens toward the radial margin, it is called a radial loop.
3. **Whorls** - it is any ridge configuration with two or more triradii. One triradius is on the radial and other on the ulnar side of the pattern. It is subdivided into 2 types A) Concentric whorl b) Spiral whorl.

**Interpretation of palmar print**

In the palm of a normal individual, three major creases are seen.

1. Distal crease (DC) - originate from the lateral side of the palm and ends in between the pointing finger and the middle finger.

2. Proximal thenar crease (PC) - originates from the hypothenar region and ends in between the thumb and pointing finger.

3. Thenar crease (TC) originate from the base of palm and ends in between the thumb and pointing finger, generally fused with PC.

**Ridge counting** was used to indicate the pattern size.
The parameter used were-

a) Total finger ridge count (TFRC)
b) Absolute finger ridge count (AFRC)
c) ATD angle

---

**Fig. 1** Arch, Loop, Whorl

**Fig 2:** a, b, c, d are the digital triradii, t is axial triradii and II, III and IV are second, third and fourth interdigital areas.
STATISTICAL ANALYSIS
The data recorded was entered in Microsoft excel sheet and applied for statistical analysis. Chi - square test was applied for each variable, to compare the proportions and p was determined.

RESULTS

Distribution of TC in control group and study group

<table>
<thead>
<tr>
<th>GROUPS</th>
<th>NORMAL</th>
<th>PERCENTAGE</th>
<th>VARIATION</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group (n=200)</td>
<td>165</td>
<td>82.5%</td>
<td>35</td>
<td>17.5%</td>
</tr>
<tr>
<td>Study Group (n=200)</td>
<td>147</td>
<td>73.5%</td>
<td>53</td>
<td>26.5%</td>
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</table>

Distribution of PC in control group and study group

<table>
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<tr>
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<th>VARIATION</th>
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</thead>
<tbody>
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<td>177</td>
<td>88.5%</td>
<td>23</td>
<td>11.5%</td>
</tr>
<tr>
<td>Study group</td>
<td>185</td>
<td>92.5%</td>
<td>15</td>
<td>7.5%</td>
</tr>
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Distribution of DC in Control group and Study group

<table>
<thead>
<tr>
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<th>VARIATION</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group (n=200)</td>
<td>196</td>
<td>98%</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Study group</td>
<td>175</td>
<td>87.5%</td>
<td>25</td>
<td>12.5%</td>
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Distribution of ATD angle in Control group and Study group

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</tr>
</thead>
<tbody>
<tr>
<td>Control Group (n=200)</td>
<td>108</td>
<td>54%</td>
<td>92</td>
<td>46%</td>
</tr>
<tr>
<td>Study group</td>
<td>48</td>
<td>24%</td>
<td>152</td>
<td>76%</td>
</tr>
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Distribution of variables in variation group

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<th>VARIATION</th>
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</thead>
<tbody>
<tr>
<td>Control Group (n= 92)</td>
<td>7</td>
<td>8%</td>
<td>85</td>
<td>92%</td>
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<tr>
<td>Study group ( n= 152)</td>
<td>3</td>
<td>2%</td>
<td>149</td>
<td>98%**</td>
</tr>
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</table>

Table No 5 Distribution of (a) in variables in Control group and Study group

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<th>VARIATION</th>
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</thead>
<tbody>
<tr>
<td>Control Group (n= 92)</td>
<td>199</td>
<td>99.5%</td>
<td>1</td>
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<tr>
<td>Study group ( n= 152)</td>
<td>194</td>
<td>9.7%</td>
<td>6</td>
<td>3%**</td>
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</table>

Table No 6 Distribution of (b) in variables in Control group and Study group

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<tbody>
<tr>
<td>Control Group (n= 92)</td>
<td>189</td>
<td>94.5%</td>
<td>11</td>
<td>5.5%</td>
</tr>
<tr>
<td>Study group ( n= 152)</td>
<td>198</td>
<td>99%</td>
<td>2</td>
<td>1%</td>
</tr>
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</table>

Table No 7: Distribution of (c) in variables in Control group and Study group

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<th>PERCENTAGE</th>
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</thead>
<tbody>
<tr>
<td>Control Group (n= 200)</td>
<td>170</td>
<td>94.5%</td>
<td>11</td>
<td>5.5%</td>
</tr>
<tr>
<td>Study group (n= 200)</td>
<td>198</td>
<td>99%</td>
<td>2</td>
<td>1%</td>
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</table>

Table No 8: Distribution of (d) in variables in Control group and Study group

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<th>VARIATION</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group (n= 200)</td>
<td>131</td>
<td>65.5%</td>
<td>69</td>
<td>34.5%</td>
</tr>
<tr>
<td>Study group (n= 200)</td>
<td>136</td>
<td>68%</td>
<td>64</td>
<td>32%</td>
</tr>
</tbody>
</table>
DISCUSSION

Dermatoglyphics are the dermal ridge configurations on the digits, palms and soles. They begin to develop about the 13th week of prenatal life, as the fetal mounds on the digit tips, interdigital, thenar and hypothenar areas of the hand. The pattern formation is complete by the 19th week.

Dermatoglyphics has been a useful tool in understanding basic questions in biology, medicine and genetics and serves as a tool to predict occurrences and risk for biomedical events. Extensive investigations into chromosomal disorders like down’s syndrome, turner syndrome etc and their dermatoglyphic manifestation have been conducted and positive result were found.

Oral cancer, being the most common cancer in India has various etiologic factors like tobacco, alcohol, viral, dietary and genetic factors. Genetically determined susceptibility to external carcinogen may be important in the etiology of squamous cell carcinoma, as many persons exposed to tobacco and alcohol do not develop oral cancer. Identifying persons at high risk for squamous cell carcinoma of head and neck is important thus the present study was planned to check correlation between dermatoglyphic and squamous cell carcinoma.

In the present study, the observations based on 200 cases studied (control group and study group, n= 200), revealed, that the distribution of TC (thenar crease), in the study group, showed normal pattern in 73.5% and varied pattern in 26.5%.

In the distribution of DC (Distal crease), in the study group, was found to be normal in 87.5% and varied in 12.5%. The atd angle was found to be normal in 97% and varied in 3% in the study group. In the varied pattern, the frequency of atd angle above normal and below normal was found to be 2% and 98% respectively.

In the present study, variables that showed stastically significant differences between dermatoglyphic pattern of controls and those patients under study - The difference in the distribution of TC was statistically significant.

The difference in the distribution of DC, atd angle and (c) was highly significant. In the distribution of patterns of fingertips, the most common pattern seen was ulnar loop (50.7%), followed by single loop whorl (31.8%) in the study group.

CONCLUSION

Dermatoglyphic is the easy and noninvasive technique to record finger and palm print. Seeing the high cases of oral squamous cell carcinoma this technique can be used as an adjunct to check genetic susceptibility for high risk patient.

BIBLIOGRAPHY
INTRODUCTION

The dramatic increase in the prevalence of obesity over the past few decades strongly suggest that preventive strategies will become more important as time goes on. Public health strategies that virtually impose behavior change along with healthy food are more successful in this regard. Long term changes in life style both in diet and in physical activity are required for weight maintenance. 1-3 Cells are protected against oxidative damage by the body’s defense system. The defense system includes molecules that interact directly with the free radicals to neutralize them, (ascorbic acid, and alpha tocopherols). A diet high in whole and unrefined foods favorably alters antioxidant defense. Antioxidants have the role of counteracting free radical before free radicals arise in the body from inside and outside sources. 4-5 Behavioral and eating habits modifications to avoid some of effects of obesogenic environment are the cornerstone of long term control of weight. 6 The present study emphasizes on an anthropometric and clinical study with maize diet in 1001 Gujarati and Non Gujarati girls, aged between 18-30 years before and after maize diet. Out of the 1001 girls, 526 girls were Gujaratis and 475 girls were Non Gujaratis. They were further distributed according to age, inhabitance, socio economic status, dietary habits, weight, height, body mass index, waist circumference, hip circumference, waist hip ratio, obesity indices, body fat percent, total body fat, lean body mass, skinfold thickness, family history and blood pressure. In the second part of the study the girls were examined for ascorbic acid and vitamin E, before and after maize diet along with the statistical evaluation of all the parameters.

MATERIAL AND METHOD

The present study encompasses anthropometry study as well as clinical study with Maize diet in 1001 Gujarati as well as Non Gujarati girls aged between 18 to 30 years to study the antioxidants before and after maize diet. Every subject in each group was asked to replace the wheat chapatti by maize chapatti and no change was made in the rest of the dietary ingredients. They were asked to take maize diet for 30 days. The study protocol was approved before the commencement of the study by the Institutional Ethics Committee and all the girls gave their written informed consent. The girls were residing in different institutional hostels. Actually these girls had come from different districts of Gujarat, Rajasthan mainly and also from other States like Maharashtra, Uttar Pradesh, Madhya Pradesh etc.
for study purpose, so they were selected for this study. Interview schedule was developed to collect the general information regarding age, dietary habits, socioeconomic status, suffering from any illness, or taking any treatment, caste, religion etc. The subjects with any clinical or biochemical evidence of liver, kidney or endocrine disease and those on treatment that effect the lipid metabolism were excluded from the study. The categorization of obese subjects were made on the basis of body mass index (BMI) \( \geq 25 \) or waist hip ratio (WHR) \( \geq 0.84 \) or standard chart of desirable weight in relation to height, published by Metropolitan Life Insurance Company (Bray,1978) \(^1\) as well as on the basis of skin fold thickness. Normal subjects of identical age group with that of respective obese group acted as control. Measurement of different Anthropometric parameters like age, height, weight was done. The most widely used clinical tool for measurement of obesity is the Body Mass Index (BMI) i.e. wt. in Kg / m\(^2\) height. BMI was accurately calculated using SI units Recently the Ministry’s Consensus for the prevention and management of obesity and metabolic syndrome for the country has declared that the country’s new diagnostic cut off for the body mass index is 23 kg/m\(^2\) as opposed to 25 kg/m\(^2\) globally \( [\text{Health Ministry, Diabetes Foundation of India, All India Institute of Medical Sciences, Indian Council of Medical Research, The National Institute of Nutrition, 11/26/2008}] \). According to them, a person with a body mass index of 23 kg/m\(^2\) will now be considered as overweight and below that as one with normal BMI – unlike the cut off limit of 25 kg/m\(^2\) earlier. Those with BMI of 25 kg/m\(^2\) will be clinically termed obese as opposed to 30 kg/m\(^2\) at the international level, and those with BMI of 32.5 kg/m\(^2\) will require bariatric surgery to estimate excess flab. Every subject blood pressure was measured with a standardized protocol with an aneroid sphygmomanometer. Waist Circumference was measured in centimeters at the mid-point between the bottom of the ribs and the top of the iliac crest. Women with a waist circumference less than 80 cm was considered as normal while with 80 – 87.9 cm were classified as overweight, and women with waist circumference >88 cm were classified as obese (Park 2005). \(^8\) Recently, the Health Ministry has declared that cut off’s for waist circumference will now be 90 cm for Indian men as opposed to 102 cm globally, and 80 cm for Indian women as opposed to 88 cm at the international level. \(^9\) Hip Circumference was measured at the largest posterior extension of the buttocks. Waist Hip Ratio was determined by dividing WC by HC. WHR= WC/HC Women with a WHR less than 0.80 was categorized as normal while between 0.80 – 0.84 were classified as overweight and women with a WHR >0.85 were classified as obese (Park 2005). \(^10\) For measurement of Skin fold Thickness \(^1\), \(^1\) \(^7\), \(^2\) \(^6\) all measurements were taken, with the subject seated on a stool, on the right side of the body. The sites selected were biceps, triceps, subscapular, supra iliac. At these four sites, the skin fold was pinched up firmly between the thumb and forefinger and pulled away slightly from the underlying tissues before applying the calipers for the measurements. The average of the four sites was taken as skin fold thickness in centimeter. The instrument used was the Harpenden skin fold caliper. (British Indicators Ltd. St. Albans, Herts.); which exerts a constant pressure at varying openings of the jaws. Total body fat percent was calculated using the following formula as reported by YMCA formula (Young men Christian association). \(^12\) \(^2\) \(^6\) It uses only body weight and waist (at naval) measurements to calculate body fat percentage. \(^13\) 

\[
\text{Body Fat} \% = \frac{-7.67+4.15 \times \text{Waist} - 0.082 \times \text{Weight} \times 100}{\text{Weight}}
\]

Body Fat was calculated by multiplying body weight (kg) with body fat percentage. \(^14\) Lean Body Mass (LBM) was obtained by subtracting the body fat (kg) from total body weight. \(^15\)

The venous blood samples were collected by the Standard techniques. Blood was collected in the morning after minimum of 12 hour of overnight fasting. 5 – 6 ml of blood from antecubetal vein was withdrawn in a perfectly clean dry syringe and was transferred to a clean dry centrifuge tube slowly by the side of the tube after removing needle to avoid haemolysis. All the blood samples were taken in the recumbent position. The blood was allowed to clot at room temperature for 30 minutes. The serum was separated by centrifugation at 3000 revolutions per minute (rpm) for 15 minutes. Samples with signs of haemolysis were discarded. Analytical Grade Chemicals and standards were used. The serum was preserved in refrigerator at 4°C. MDA was estimated in serum. The present study encompasses clinical study with Maize diet in 1001 Gujarati as well as Non Gujarati girls aged between 18 to 30 years before and after maize diet. Normal subjects of identical age group with that of respective obese group acted as control. The subjects were divided into two groups: 

**Control group:** Possessing normal body weight with healthy body mass index between 18 -25 kg/m\(^2\).

**Study Group:** Possessing overweight/obesity having body mass index between 25 to 30 kg/m\(^2\). Every subject in each group was asked to replace the wheat chapatti by maize chapatti and no change was made in the rest of the ingredients. They were asked to take the maize diet for thirty days. Physical and biochemical parameters were determined before and after consumption of the maize diet for thirty days, and, the effect of maize fibers was studied. The
difference in the parameters was evaluated when the two communities Gujarati and Non Gujarati were compared with each other before as well as after the maize diet. The study evaluated antioxidant enzymes in obesity and the effect of maize diet on the parameters. The parameters selected were ascorbic acid and alpha tocopherol along with the statistical analysis with t and p values.

Ascorbic acid was done according to method of Natelson,1971 [2]

**Procedure:**
To 0.4 ml of serum, 1.6 ml of 10 % trichloroacetic acid was added, mixed and centrifuged at 2000 rpm. To 1.0 ml of supernatant, 0.4 ml of dinitrophenyl hydrazine reagent was added, stoppered and incubated at 37°C for 3 hours. After 3 hours it was chilled in ice bath and 1.6 ml of cold 65 % H₂SO₄ was added. After 30 min the sample was read at 520 nm. Blank composed of 1.0 ml of trichloroacetic acid was treated as for serum/plasma filtrate and standard comprised 0.4 ml of 1 mg/100 ml ascorbic acid was also treated in similar fashion.

**Calculation:**

\[
\text{Ascorbic acid (mg/dl)} = \frac{(\text{Reading of unknown at 520 nm} - \text{Reading of at 460 nm } 0.29)}{(\text{Reading of standard at 520 nm})} \times 1
\]

Normal range: 0.8-1.5 mg/dl.

**Alpha-tocopherol was done according to method of Baker and Frank, 1968[3]**

This method is based on the reduction of the ferric chloride ions by tocopherols after xylene extraction of the blood samples. The ferrous ions react with alpha, alpha biopyridyl to give a red color which is measured in a 520 nm.

**Procedure:**
Into 3 stoppered centrifuged tubes measure 1.5 ml serum, 1.5 ml standard and 1.5 ml water (Blank) respectively. To Test and Blank add 1.5 ml ethanol and to the standard 1.5 ml water. Then add 1.5 ml xylene to all tubes, stopper mix well, and centrifuge. Transfer 1 ml of the xylene layers into other stoppered tubes taking care not to include any ethanol or protein. Add 1 ml alpha-alpha dipryridyl reagent to each tube, stopper and mix. Pipette 1.5 ml of the mixture into colorimeter cuvettes and read the extinction of the Teat and the Standard against the Blank at 460 nm. Then in turn beginning with the Blank add 0.33 ml ferric chloride solution, mix and after exactly 1.5 min read test and standard against the blank at 520 nm.

**Calculation:**

\[
\text{Serum tocopherol (mg/dl)} = \frac{(\text{Mean 1}-\text{Mean 2})}{\text{SED}}
\]

Normal range: 0.8-1.5 mg/dl.

**STATISTICAL ANALYSIS:**

1. **Mean (X) =** \(\frac{\text{Sum of observations}}{\text{Total No. of cases}}\)
2. **Standard Deviation (SD) =** \(\sqrt{\frac{\text{Square of term}-(\text{Mean})^2}{n-1}}\)
3. **Students “t” test:** \(T = \frac{\text{Mean 1} - \text{Mean 2}}{\text{SED}}\)
4. **SED =** \(\sqrt{(\text{SE1} \times \text{SE1}) - (\text{SE2} \times \text{SE2})}\)

By using t values, P value was determined and if P value was more than 0.05 it is not significant, if it is less than 0.05 then it is significant, P value : a=<0.05; b=<0.01; c=<0.001. Statistical analysis was done with the help of SPSS software.

**RESULTS**

For antioxidant vitamins E and C, the acceptable ranges are 6-19 mg/l and 0.8-1.5 mg/dl. Values of vitamin-C and vitamin E were 1.14 ± 0.19mg/dl and 8.32 ± 2.72mg/l respectively before the diet, which improved to 1.17± 0.19mg/dl and 18.18 ± 2.45mg/l respectively after the maize diet for thirty days. Vitamin C and E showed significant changes (P < 0.001). Results were almost similar for Gujarati and NonGujarati girls except that vitamin C for Gujarati, NonGujarati was P<0.05. The subjects were divided into categories like age, inhabitance, socioeconomic status, diet, weight, body mass index, waist circumference, hip circumference, waist hip ratio, obesity indices, total body fat percentage, body fat, lean body mass, skinfold thickness, family history and blood pressure and the parameters were studied along with statistical evaluation in all the categories. Nearly both the parameters showed significant changes when comparison was done before and after maize diet (P<0.001). Gujarati girls showed significant changes (P<0.05) but NonGujarati girls of same age range showed no significant change in vitamin-C, before and after the diet. When
comparison was between Gujarati and NonGujarati of this age group, statistically significant changes were observed only for vitamin C (P<0.05), after the maize diet. Almost similar results were obtained for age > 20 years for total girls. However, more significant parameters as compared to the group age < 20 years were obtained when comparison was between Gujarati and Nongujarati. The parameters which were significant before as well as after the maize diet were vitamin-C (P<0.01), vitamin E (P<0.05). Vitamin C was statistically significant for only urban girls (P<0.001). Keeping in view that obesity is a disorder mainly of affluent class; the girls were divided as lower, middle and upper socio economic class. The antioxidant for lower socioeconomic class was better as compared to that in upper socioeconomic class. Vitamin C, vitamin E, for lower category was 1.15± 0.19 mg/dl, 8.32, ± 2.53mg/l, vs upper class 1.13± 0.1919 mg/dl, 8.31± 2.69mg/l. Vitamin C was significant for middle and upper socioeconomic class (P<0.05) but insignificant for lower class. As diet plays an imp role in development of obesity, subjects were divided as vegetarian and non-vegetarian. The effect of maize was almost similar for both the groups. Both parameters were highly significant in both the groups. When the antioxidant activity of lower weight category was compared which that of higher weight category the mean values of vitamin C, vitamin E, were in acceptable range for lower weight group (1.4 ± 0.11mg/dl v/s 0.92 ± 0.10mg/dl; 12.92 ± 3.1mg/l v/s 6.01 ± 0.67mg/l). Both the parameters for all three weight ranges were highly significant when matched for maize diet. As far as effect of maize diet is concerned all four groups of body mass index showed almost similar results in form of highly significant parameters (P < 0.001). There were three categories as waist circumference < 80 cm, waist circumference 80-87.9 cm and waist circumference > 88 cm and two categories of hip Circumference as < 36" and > 36". Effect of maize was significant for nearly all parameters (P < 0.001). In both the groups of hip circumference both parameters were statistically significant when matched for maize diet except vitamin C which was significant (P < 0.001) for hip circumference < 36" but insignificant for the other group. There were three groups of waist hip ratio as underweight (< 0.8), normal (0.80-0.84) and obese (>0.84). Vitamin C and vitamin E in all groups altered significantly after maize (P <0.001). Dietary effect of maize was highly significant in all categories of obesity indices (P < 0.001). Comparison of Gujarati and NonGujarati exhibited statistically significant value (P < 0.05) for them in body mass index > 25 kg/m²along with vitamin E (P < 0.05).

Table 1(a): Antioxidants, Vitamin C and vitamin E in total, Gujarati and NonGujarati girls in relation to weight, BMI, W/H, and obesity indices before and after maize diet

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Total Girls (n=1001)</th>
<th>Gujarati Girls (n=526/1001)</th>
<th>Non Gujarati Girls (n=475/1001)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>Mean ±SD</td>
<td>Mean</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>1.14 ± 0.19</td>
<td>1.17</td>
<td>0.19</td>
<td>1.14</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>8.32</td>
<td>2.72</td>
<td>10.18</td>
</tr>
<tr>
<td>WT66-80KG</td>
<td>Total Girls (n=251/1001)</td>
<td>Gujarati Girls (n=114/251)</td>
<td>Non Gujarati Girls (n=137/251)</td>
</tr>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>Mean ±SD</td>
<td>Mean</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>0.92</td>
<td>0.96</td>
<td>0.1</td>
<td>0.91</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>6.01</td>
<td>0.67</td>
<td>8.01</td>
</tr>
<tr>
<td>BMI30-34.99</td>
<td>Total Girls (n=24/1001)</td>
<td>Gujarati Girls (n=10/24)</td>
<td>Non Gujarati Girls (n=14/24)</td>
</tr>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>Mean ±SD</td>
<td>Mean</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>0.74</td>
<td>0.07</td>
<td>0.77</td>
<td>0.06</td>
</tr>
<tr>
<td>5.4</td>
<td>0.06</td>
<td>7.4</td>
<td>0.06</td>
</tr>
<tr>
<td>W/H&gt;0.84</td>
<td>Total Girls (n=468/1001)</td>
<td>Gujarati Girls (n=240/468)</td>
<td>Non Gujarati Girls (n=228/468)</td>
</tr>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>Mean ±SD</td>
<td>Mean</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>0.97</td>
<td>0.11</td>
<td>1.01</td>
<td>0.1</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>6.35</td>
<td>0.91</td>
<td>8.35</td>
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<tr>
<td>high WC, WHR and BMI &gt;25</td>
<td>Total Girls (n=240/1001)</td>
<td>Gujarati Girls (n=131/240)</td>
<td>Non Gujarati Girls (n=109/240)</td>
</tr>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>Mean ±SD</td>
<td>Mean</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>0.91</td>
<td>0.09</td>
<td>0.95</td>
<td>0.09</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>5.88</td>
<td>0.47</td>
<td>7.88</td>
</tr>
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</table>
TABLE 1(b): Antioxidants, Vitamin C and vitamin E in total, Gujarati and Non-Gujarati girls in relation to weight, BMI, WH, and obesity indices with t and P values before and after maize diet

**BMI: Body mass index, WH: Waist hip ratio**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>3.79&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.42&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.34&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0.79</td>
<td>0.79</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>16.08&lt;sup&gt;a&lt;/sup&gt;</td>
<td>10.69&lt;sup&gt;a&lt;/sup&gt;</td>
<td>11.33&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1.21</td>
<td>0.75</td>
</tr>
<tr>
<td>WT66-80KG</td>
<td>Total Girls B vs A (n=251/1001)</td>
<td>Gujar Girls B vs A (n=114/251)</td>
<td>Non-Guj Girls B vs A (n=137/251)</td>
<td>Gujar vs Non Gjud Girls BMD (114vs137)</td>
<td>Gujar vs Non Gjud AMD (114vs137)</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>4.12&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.93&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.94&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-1.51</td>
<td>-1.58</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>33.6&lt;sup&gt;a&lt;/sup&gt;</td>
<td>23.05&lt;sup&gt;c&lt;/sup&gt;</td>
<td>24.59&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-1.07</td>
<td>-1.07</td>
</tr>
<tr>
<td>BMI30-34.99</td>
<td>Total Girls B vs A (n=24/1001)</td>
<td>Gujar Girls B vs A (n=10/24)</td>
<td>Non-Guj Girls B vs A (n=14/24)</td>
<td>Gujar vs Non Gjud Girls BMD (10vs14)</td>
<td>Gujar vs Non Gjud AMD (10vs14)</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>2.11&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.28</td>
<td>0.43</td>
<td>0.43</td>
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<tr>
<td>Vitamin E (mg/l)</td>
<td>115.08&lt;sup&gt;a&lt;/sup&gt;</td>
<td>87.89&lt;sup&gt;c&lt;/sup&gt;</td>
<td>80.1&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>W/H&gt;0.84</td>
<td>Total Girls B vs A (n=468/1001)</td>
<td>Gujar Girls B vs A (n=228/468)</td>
<td>Non-Guj Girls B vs A (n=240/468)</td>
<td>Gujar vs Non Gjud Girls BMD (240vs228)</td>
<td>Gujar vs Non Gjud AMD (240vs228)</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>5.13&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.81&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.46&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0</td>
<td>-1.03</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>34.01&lt;sup&gt;a&lt;/sup&gt;</td>
<td>22.96&lt;sup&gt;c&lt;/sup&gt;</td>
<td>25.48&lt;sup&gt;c&lt;/sup&gt;</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>high WC, WHR and BMI &gt; 25</td>
<td>Total Girls B vs A (n=240/1001)</td>
<td>Gujar Girls B vs A (n=131/240)</td>
<td>Non-Guj Girls B vs A (n=109/240)</td>
<td>Gujar vs Non Gjud Girls BMD (131vs109)</td>
<td>Gujar vs Non Gjud AMD (131vs109)</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>4.65&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.42&lt;sup&gt;c&lt;/sup&gt;</td>
<td>3.17&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.86</td>
<td>0.86</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>46.32&lt;sup&gt;a&lt;/sup&gt;</td>
<td>29.38&lt;sup&gt;c&lt;/sup&gt;</td>
<td>42.66&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.05&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.05&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**TABLE 2(a) and 2(b): Antioxidants, Vitamin C and vitamin E in total, Gujarati and non Gujarati girls in relation to BF%, TBF, LBM, SFT, family history and blood pressure with t and P values before and after maize diet. BF%: Body fat percent, TBF: Total body fat, LBM: Lean body mass, SFT: Skin fold thickness.**

<table>
<thead>
<tr>
<th>BF% &gt; 33%</th>
<th>Total Girls (n=201/1001)</th>
<th>Gujarati Girls (n=105/201)</th>
<th>Non Gujarati Girls (n=96/201)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
</tr>
<tr>
<td>Vitamin C (mg/dl)</td>
<td>0.92</td>
<td>0.13</td>
<td>0.96</td>
</tr>
<tr>
<td>Vitamin E (mg/l)</td>
<td>6.13</td>
<td>1.22</td>
<td>8.11</td>
</tr>
<tr>
<td>BF &gt; 20Kg</td>
<td>Total Girls (n=270/1001)</td>
<td>Gujarati Girls (n=132/270)</td>
<td>Non Gujarati Girls (n=138/270)</td>
</tr>
<tr>
<td>Before</td>
<td>After</td>
<td>Before</td>
<td>After</td>
</tr>
</tbody>
</table>
### Mean ±SD

#### Vitamin C (mg/dl)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Girls (n=558/1001)</td>
<td>0.91</td>
<td>0.08</td>
<td>0.95</td>
<td>0.08</td>
<td>0.9</td>
<td>0.08</td>
<td>0.94</td>
<td>0.08</td>
<td>0.91</td>
<td>0.09</td>
</tr>
<tr>
<td>Gujarati Girls (n=293/558)</td>
<td>0.93</td>
<td>0.08</td>
<td>0.94</td>
<td>0.08</td>
<td>0.91</td>
<td>0.08</td>
<td>0.95</td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non Gujarati Girls (n=265/558)</td>
<td>0.91</td>
<td>0.09</td>
<td>0.95</td>
<td>0.1</td>
<td>0.93</td>
<td>0.09</td>
<td>0.94</td>
<td>0.1</td>
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</table>

#### Vitamin E (mg/l)

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Girls (n=558/1001)</td>
<td>5.83</td>
<td>0.36</td>
<td>7.83</td>
<td>0.36</td>
<td>5.82</td>
<td>0.37</td>
<td>7.82</td>
<td>0.37</td>
<td>5.85</td>
<td>0.36</td>
</tr>
<tr>
<td>Gujarati Girls (n=293/558)</td>
<td>5.83</td>
<td>0.36</td>
<td>7.83</td>
<td>0.36</td>
<td>5.82</td>
<td>0.37</td>
<td>7.82</td>
<td>0.37</td>
<td>5.85</td>
<td>0.36</td>
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<tr>
<td>Non Gujarati Girls (n=265/558)</td>
<td>5.82</td>
<td>0.35</td>
<td>7.81</td>
<td>0.35</td>
<td>5.81</td>
<td>0.35</td>
<td>7.81</td>
<td>0.35</td>
<td>5.84</td>
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### LBM > 42Kg

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<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
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<th>±SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Girls (n=558/1001)</td>
<td>1.06</td>
<td>0.17</td>
<td>1.09</td>
<td>0.17</td>
<td>1.07</td>
<td>0.17</td>
<td>1.06</td>
<td>0.17</td>
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<td>0.17</td>
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<tr>
<td>Gujarati Girls (n=293/558)</td>
<td>1.07</td>
<td>0.17</td>
<td>1.1</td>
<td>0.17</td>
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<td>0.17</td>
<td>1.06</td>
<td>0.17</td>
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<td>0.17</td>
</tr>
<tr>
<td>Non Gujarati Girls (n=265/558)</td>
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<td>0.16</td>
<td>1.03</td>
<td>0.16</td>
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### SFT > 51 mm

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<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
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<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
<th>Mean</th>
<th>±SD</th>
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<tbody>
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<td>1.1</td>
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<td>1.07</td>
<td>0.17</td>
<td>1.06</td>
<td>0.17</td>
<td>1.06</td>
<td>0.17</td>
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<tr>
<td>Gujarati Girls (n=348/691)</td>
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<td>0.17</td>
<td>1.1</td>
<td>0.17</td>
<td>1.07</td>
<td>0.17</td>
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### Family History of Hypertension

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<tr>
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<td>0.12</td>
<td>0.96</td>
<td>0.11</td>
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<td>0.94</td>
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<td>Gujarati Girls (n=22/68)</td>
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<td>0.12</td>
<td>0.96</td>
<td>0.11</td>
<td>0.88</td>
<td>0.08</td>
<td>0.92</td>
<td>0.08</td>
<td>0.94</td>
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<td>0.1</td>
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<td>0.1</td>
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<th>Mean</th>
<th>±SD</th>
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</thead>
<tbody>
<tr>
<td>Total Girls (n=51/1001)</td>
<td>0.99</td>
<td>0.16</td>
<td>1.03</td>
<td>0.15</td>
<td>0.97</td>
<td>0.12</td>
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### SBP Range of 121-139 mmHg

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<th>Mean</th>
<th>±SD</th>
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<th>Mean</th>
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<tr>
<td>Total Girls (n=535/1001)</td>
<td>6.03</td>
<td>1.58</td>
<td>8.63</td>
<td>1.49</td>
<td>6.38</td>
<td>1.05</td>
<td>8.73</td>
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<td>6.98</td>
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<td>Gujarati Girls (n=273/535)</td>
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<td>1.6</td>
<td>8.66</td>
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<td>6.36</td>
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<td>Non Gujarati Girls (n=262/535)</td>
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### Table 2 (b)

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<tr>
<th>BF% &gt; 33%</th>
<th>Total Girls B vs A (n=201/1001)</th>
<th>Guj Girls B vs A (n=105/201)</th>
<th>Non Guj Girls B vs A (n=96/201)</th>
<th>Guj vs Non Guj BMD (105vs96)</th>
<th>Guj vs Non Guj AMD (105vs96)</th>
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<tr>
<td>Vitamin C (mg/dl)</td>
<td>3b</td>
<td>2.3a</td>
<td>1.95</td>
<td>0</td>
<td>2.02a</td>
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<tr>
<td>Vitamin E (mg/l)</td>
<td>17.03c</td>
<td>12.31c</td>
<td>11.78c</td>
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<tr>
<td>BF &gt; 20Kg</td>
<td>Total Girls B vs A (n=270/1001)</td>
<td>Guj Girls B vs A (n=132/270)</td>
<td>Non Guj Girls B vs A (n=138/270)</td>
<td>Guj vs Non Guj BMD (132vs138)</td>
<td>Guj vs Non Guj AMD (132vs138)</td>
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<tr>
<td>Vitamin C (mg/dl)</td>
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<td>4.09c</td>
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<tr>
<td>Vitamin E (mg/l)</td>
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<td>43.88c</td>
<td>46.76c</td>
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<td>LBM &gt; 42Kg</td>
<td>Total Girls B vs A (n=558/1001)</td>
<td>Guj Girls B vs A (n=293/558)</td>
<td>Non Guj Girls B vs A (n=265/558)</td>
<td>Guj vs Non Guj BMD (293vs265)</td>
<td>Guj vs Non Guj AMD (293vs265)</td>
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<tr>
<td>Vitamin C (mg/dl)</td>
<td>3.32c</td>
<td>2.3a</td>
<td>2.42a</td>
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<td>Vitamin E (mg/l)</td>
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<td>14.81c</td>
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<td>SFT &gt; 51 mm</td>
<td>Total Girls B vs A (n=691/1001)</td>
<td>Guj Girls B vs A (n=348/691)</td>
<td>Non Guj Girls B vs A (n=343/691)</td>
<td>Guj vs Non Guj BMD (348vs343)</td>
<td>Guj vs Non Guj AMD (348vs343)</td>
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<td>Guj. Girls B vs A (n=29/100)</td>
<td>Non Guj. Girls B vs A (n=71/100)</td>
<td>Guj vs Non Guj BMD (29vs71)</td>
<td>Guj vs Non Guj AMD (29vs71)</td>
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<td>Total Girls B vs A (n=68/1001)</td>
<td>Guj. Girls B vs A (n=22/68)</td>
<td>Non Guj. Girls B vs A (n=46/68)</td>
<td>Guj vs Non Guj BMD (22vs46)</td>
<td>Guj vs Non Guj AMD (22vs46)</td>
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<tr>
<td></td>
<td>11.82&lt;sup&gt;c&lt;/sup&gt;</td>
<td>6.7&lt;sup&gt;c&lt;/sup&gt;</td>
<td>9.9&lt;sup&gt;c&lt;/sup&gt;</td>
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<tr>
<td>family history of CAD</td>
<td>Total Girls B vs A (n=51/1001)</td>
<td>Guj. Girls B vs A (n=28/51)</td>
<td>Non Guj. Girls B vs A (n=23/51)</td>
<td>Guj vs Non Guj BMD (28vs23)</td>
<td>Guj vs Non Guj AMD (28vs23)</td>
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<td>1.42</td>
<td>-2.34&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>family history of diabetes</td>
<td>SBP range of 121-139 mmHg</td>
<td>Total Girls B vs A (n=535/1001)</td>
<td>Guj Girls B vs A (n=273/535)</td>
<td>Non Guj Girls B vs A (n=262/535)</td>
<td>Guj vs Non Guj BMD (273vs262)</td>
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<tr>
<td></td>
<td>3.83&lt;sup&gt;c&lt;/sup&gt;</td>
<td>2.92&lt;sup&gt;b&lt;/sup&gt;</td>
<td>2.53&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Vitamin E (mg/l)</td>
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<td>17.08&lt;sup&gt;c&lt;/sup&gt;</td>
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<td>DBP range of 81-90 mmHg</td>
<td>Total Girls B vs A (n=458/1001)</td>
<td>Guj Girls B vs A (n=237/458)</td>
<td>Non Guj Girls B vs A (n=221/458)</td>
<td>Guj vs Non Guj BMD (237vs221)</td>
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<td>Vitamin C (mg/dl)</td>
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![Graph showing the comparison of vitamin E levels before and after intervention for total, Gujratian, and Non-Gujratian girls.](image-url)
Graph Showing Vitamin C and Vitamin E before and after maize diet

Graphs showing level of Vitamin C and Vitamin E in Total, Gujarati and Non Gujarati girls in high and normal obesity indices
DISCUSSION

According to Aronne LJ (2002)\(^5\) in the recent past, no other research area has generated more cajoling enthusiasm than “Antioxidants” in the modern medicine. Antioxidants come into picture because a sound antioxidant status should logically serve as a guard against obesity and overweight states\(^7\) Keeping this in view we have examined nutrient antioxidants, vitamin C and vitamin E.

Our results were in agreement with those of Moor de Burges,\(^2\) who found decreased antioxidants in obese adults and those of Kuno et al \(^10\) who found decreased levels in girls. Our study results clearly demonstrate that obesity, in absence of other confounding factors like smoking, hypertension, diabetes mellitus, hyperlipidemia, is an independent risk factor for lipid peroxidation and depletion of cytoprotective enzymes.\(^18\)-\(^22\)

The effect of maize diet was positive on all the levels of antioxidant enzymes in all the categories. Vitamin C and vitamin E were significantly increased in all the categories of BMI (1.26 mg/dl v/s 1.29mg/dl; 9.42mg/l v/s 11.23mg/l). Effect of maize diet showed diverse effects on activities of vitamin C and vitamin E levels. They were significant for age category but insignificant for rural category. This was in accordance to study done by Olusi (2000).\(^8\) Vitamin C and vitamin E showed significant changes (1.14mg/dl; 8.32mg/l) v/s (1.17mg/dl; 10.18mg/l) respectively after maize diet. These results were like those of Lalita Kaul\(^11\) who used high fiber diet rich in antioxidants in treatment of obesity. There was significant weight loss. It should not be forgotten that health promoting vitamins, minerals and antioxidants are also present in dietary fiber which may be responsible for above stated beneficial effects of maize noted in clinical trials before.\(^23\)-\(^26\) The level of vitamin C and vitamin E before as well as after the diet were higher for the girls who were less than 20 years (1.15±0.19 mg/dl and 1.18±0.18 mg/dl; 8.43±2.73 mg/l and 10.30±2.47 mg/l) as compared to the girls who were more than 20 years of age (1.12±0.2 mg/dl and 1.15±0.2 mg/dl; 8.20±2.71 mg/l and 10.05±2.43 mg/l). Their levels were higher for lower socioeconomic class (1.15±0.19 mg/dl; 8.32±2.53), for rural and vegetarian girls (1.14±0.19 mg/dl and 8.36±2.55 mg/l), (1.14±0.19 mg/dl and 8.34±2.67 mg/l). Level of these vitamins was remarkably low for higher weight and body mass index categories (0.92±0.1 mg/dl and 6.01±0.67 mg/l), (0.74±0.07 mg/dl and 5.40±0.06). Waist circumference of more than 88 cm had even low levels of these enzymes (0.85±0.08 mg/dl and 5.63±0.21 mg/l). Waist hip ratio of more than 0.9 had vitamin C level as 0.97±0.11 mg/dl and vitamin E level as 6.35±0.91 mg/l. Last but not the least, the levels of these antioxidants in category of higher obesity indices were much lower than that in normal obesity indices (0.91±0.09 mg/dl v/s 1.30±0.12 mg/dl), (5.88±0.47 mg/l v/s 10.40±2.64 mg/l).

SUMMARY AND CONCLUSION

All the parameters, nutrient antioxidants like vitamin C and vitamin E were well within acceptable ranges as per ATP III guidelines in total, Gujarati and Non Gujarati girls. Vitamin C and vitamin E were inversely related with age (1.15 mg/dl v/s 1.12mg/dl; 8.43mg/l v/s 8.20mg/l). Non vegetarian category showed low antioxidant profile when compared with the vegetarian category. Antioxidant level decreased with weight but increased with height; Antioxidant profile was least for girls with family history of CAD. Ascorbic acid level decreased with increasing waist circumference (0.96mg/dl v/s 0.85mg/dl). Maximum value of vitamin C was in the category of WC <80cm (1.21mg/dl). Alpha tocopherol also followed the same trend. It was lowest for WC >88cm, acceptable for WC 80-87.9 (6.15mg/lit) and maximum for WC <80cm. Effect of maize diet was quite evident and almost equal (P<0.001) on all parameters in total, Gujarati and Non Gujarati girls. The nutrient antioxidants showed significant higher values after the consumption of the diet (P<0.001). Vitamin C, vitamin E were significantly increased after the maize diet was consumed for thirty days (P<0.001). For Gujarati girls, vitamin C levels showed significant changes (P<0.05), When matched for age, vitamin E, ascorbic acid was significantly increased for both the age groups. When the two groups were compared with each other, only vitamin C was statistically significant (P<0.001). Effect of maize was seen for all socio economic classes. Vitamin C did not increase much for middle class. Highly significant changes were observed for almost all parameters in rural and urban categories for antioxidants when matched for diet. Vitamin C was increased only for the Gujarati urban girls (P<0.001). For the vegetarians group of girls most of the parameters improved (P<0.001). For the non-vegetarian category, vitamin C did not increase for Gujaratis and Nongujaratis, vitamin E increased only for Non Gujaratis (P<0.001). The effect of diet was highly significant for all three categories of BMI. Antioxidant status was high for high BMI group after diet. Antioxidants which were quite low for the high WHR category, were markedly increased after the diet (P<0.001). Almost all parameters were significantly changed in the comparative analysis in family history of hypertension and coronary artery disease before as well as after the diet. Hence it was concluded that oxidative stress in obese was in excess while defensive antioxidant levels were depleted and that an association exists between lower antioxidants and high oxidative stress and increased risk of obesity. Free radicals play an important role in
pathophysiology of obesity and they are destroyed by antioxidant defenses. DF modulate glucose response, prevents against carbohydrate induced hypercholesterolemia and hypertriglyceridemia, has sustained energy release-part of energy released in small intestine as glucose (source of energy for brain), part is released in large intestine as SCFA (source in muscles and fat tissue), increases glucose uptake in cells, stimulate action of insulin, slows absorption of carbohydrates by causing delay in gastric emptying, increases glucagon secretion, stimulate gluconeogenesis, divert acetyl Co A to form glucose not cholesterol, protect against atherosclerosis, favorably alters lipid metabolism, decreases TG, LDL, BP, increases HDL, antioxidants, protect against chronic diseases, affect properties like volume, bulk, viscosity, in intestinal lumen, which alters metabolic path of hepatic cholesterol and lipoprotein metabolism and lowers LDL-C-increases fat oxidation, decreases fat storage, fat cell size and its synthesis, change sequence in which body burns food-brings fat on top list, restore normal intestinal functions.

**REFERENCES:**

SERUM URIC ACID IN METABOLIC SYNDROME-A CASE CONTROL STUDY

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ABSTRACT

The metabolic syndrome is a widely prevalent and multi-factorial disorder that presents in a distinct, heterogeneous phenotype. The clinical relevance of the metabolic syndrome is related to its role in the development of cardiovascular disease. The major features of the Metabolic Syndrome include central obesity, Hyper-triglyceridemia, low high-density lipoprotein (HDL) cholesterol, Hyperglycemia and Hypertension. Mean serum uric acid levels vary with variable components of metabolic syndrome. There is a direct linear relationship between serum uric acid level and number of metabolic syndrome patients. Increased levels of serum uric acid should be considered as an important marker in patients with metabolic syndrome and Hyperuricemia is an associated abnormality that should be considered in those with metabolic syndrome.

Aim & Objective of study is to evaluate the association between serum uric acid and metabolic syndrome and correlation of uric acid levels with various components of metabolic syndrome.

Type of study was conducted as a case control study. The patients included in the study group were adults of either sex having metabolic syndrome. Cases were taken as 100 and control as 50.

Study Period: August 2012 to July 2013

Material and Method: The study conducted in department of Medicine, Santosh Medical College, Ghaziabad, Uttar Pradesh. The study was approved by the departmental scientific review board and ethics committee of SantoshMedical College & Hospitals. A written informed consent was taken from the patients inducted into the study. A copy of patient information sheet was also given to the patient.

Result: It is seen when mean serum uric acid of triglycerides, HDL, Fasting plasma glucose, Blood Pressure and Obesity was compared to mean of uric acid of controls, results was significant.

Conclusion: Hyperuricemia should be considered as a component of metabolic syndrome and risk factor for cardiovascular diseases.

Keywords: Metabolic Syndrome, Hyperuricemia, Hyperlipidemia, Hyperglycemia.

INTRODUCTION

Metabolic syndrome is defined as abnormalities that confer increased risk of cardiovascular disease (CVD) and diabetes mellitus (DM). The major features of the Metabolic Syndrome include central obesity, Hypertriglyceridemia, low high-density lipoprotein (HDL) cholesterol, Hyperglycemia and Hypertension. It is a widely prevalent and multi-factorial disorder that presents in a distinct, heterogeneous phenotype. Although obesity and insulin resistance are not synonymous with the metabolic syndrome, they are the integral features in the derangement of adipocyte physiology and carbohydrate metabolism. This syndrome predicts the development of type 2 diabetes mellitus and cardiovascular disease. The incidence of coronary disease along with carotid atherosclerosis is higher in patients with metabolic syndrome along with higher mortality from all such cases. There are currently two major definitions used for diagnosing metabolic syndrome provided by 1) International Diabetes Federation (IDF) and 2) The Revised National Cholesterol Education Program (NCEP). The revised NCEP and IDF definitions of Metabolic Syndrome are very similar and it can be accepted that they will identify many of the same individuals as having metabolic syndrome.

<table>
<thead>
<tr>
<th>Table 1: Synonyms for metabolic syndrome.</th>
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<td>- Android obesity syndrome</td>
<td>- Insulin resistance/hyperinsulinemia syndrome</td>
</tr>
<tr>
<td>- Syndrome of Affluence</td>
<td>- Atherothrombogenic syndrome</td>
</tr>
<tr>
<td>- Plurimetabolic syndrome</td>
<td>- Metabolic cardiovascular syndrome</td>
</tr>
<tr>
<td>- GHO (Glucose intolerance)</td>
<td>- Syndrome X plus</td>
</tr>
<tr>
<td>- Hypertension/Obesity syndrome</td>
<td>- Deadly quartet</td>
</tr>
<tr>
<td>- Syndrome X</td>
<td>- Cardiovascular and metabolic syndrome</td>
</tr>
<tr>
<td>- Metabolic syndrome X</td>
<td>- Dysmetabolic syndrome X</td>
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</table>

There is a direct linear relationship between serum uric acid level and number of metabolic syndrome patients. Increased levels of serum uric acid should be considered as an important marker in patients with metabolic syndrome and Hyperuricemia. Hyperuricemia is defined as a serum Uric acid concentration in excess of urate solubility, which is about 420 Pmol/l in men and 360 Pmol/l in women. Hyperuricemia is also defined when the levels of uric acid is more than > 6mg/dl or it varies...
from males (2.5mg/dl to 5.6mg/dl) and female (3.1 to 7mg/dl). \(^9\)

Since hyperuricemia was first described as being associated with hyperglycemia and hypertension by Kylin in 1923\(^7,\)\(^10\), there has been a growing interest in the association between elevated UA and other metabolic abnormalities of hyperglycemia, abdominal obesity, dyslipidemia, and hypertension, as well as a continuing debating on hyperuricemia as an additional component of the metabolic syndrome\(^11\)\(^12\). The prevalence of obesity, hypertension, diabetes, dyslipidemia, and hyperuricemia have been increasing over the last few decades due to rising living standards occurring with modernization and urbanization.\(^13\)

The main objective of this study is to evaluate the association between serum uric acid and metabolic syndrome and correlation of uric acid levels with various components of metabolic syndrome.

**MATERIALS AND METHOD**

The study conducted in department of Medicine, Santosh Medical College, Ghaziabad, Uttar Pradesh. The study was approved by the departmental scientific review board and ethics committee of Santosh Medical College & Hospitals. A written informed consent was taken from the patients inducted into the study. A copy of patient information sheet was also given to the patient. The study was conducted as a case control study. The patients included in the study group were adults of either sex having metabolic syndrome. Cases were taken as 100 and control as 50.

**Study Period:** August 2012 to July 2013

**Inclusion Criteria:**
A total of 100 subjects of old and newly diagnosed metabolic syndrome on the basis of IDF Criteria for central adiposity for the diagnosis of metabolic syndrome, According to the guidelines any two or more having the following were considered:
- Circumference > 90 cms (M), > 80 cms (F) in the south asian individuals
- Hypertriglyceridemia: triglycerides >150mg/dl or specific medication.
- Low HDL cholesterol: <40 mg/dl and <50 mg/dl, respectively for male and female or specific medication.
- Hypertension: blood pressure >130mmhg systolic or >85mmhg diastolic or specific medication.
- Fasting plasma glucose: >100mg/dl or specific medication or previously diagnosed Type 2 diabetes.

**Exclusion Criteria:**

Subjects of the study should not be having **ANY HISTORY** of
1. acute myocardial infarction or CVA.
2. gout, psoriasis, malignancy, renal stone.
3. Thyroid disorder
4. Renal failure
5. Hepatic disorder
6. Oncological disease
7. Subjects not taking drugs for hypoglycaemia, antioxidants, vitamin supplement or drugs that, are known to affect uric metabolism.

The patients attending the OPD were screened for the disease and a detailed and relevant present, past, personal, family and medical history was taken. Special emphasis was given on the obesity and co-morbid conditions associated with it, followed by baseline laboratory investigations to assess the metabolic status of the patient. After a 12 hour fasting period, venous samples were collected from all cases and control. Serum was used for analysis of uric acid and lipids. Patients fulfilling all inclusion and exclusion criterion were enrolled in the study.

**STATISTICAL ANALYSIS**

All the data was analyzed by SPSS statically software and basic parameter was compared using ANOVA test and chi square and p value was calculated.

**RESULTS AND OBSERVATION**

**Study design:** A Case Control Study with 100 subjects as cases and 50 subjects as control, which studied as role of serum uric acid with each component of metabolic syndrome, undertaken at Santosh Medical Collage and Hospital, Ghaziabad, Uttar Pradesh.
Table 2: Clinical Parameters Studied

<table>
<thead>
<tr>
<th>S.NO</th>
<th>PARAMETER</th>
<th>CONTROLS (n=50)</th>
<th>CASES (n=100)</th>
<th>P VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>AGE (yrs)</td>
<td>49.14±9.05</td>
<td>54.42±7.43</td>
<td>0.001*</td>
</tr>
<tr>
<td>2.</td>
<td>BMI (kg/m2)</td>
<td>27.83±4.00</td>
<td>30.28±4.65</td>
<td>0.001*</td>
</tr>
<tr>
<td>3.</td>
<td>CENTRAL OBESITY (cms)</td>
<td>82.20±11.15</td>
<td>100.02±7.611</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>4.</td>
<td>DURATION OF DIABETES (yrs)</td>
<td>1.68±4.206</td>
<td>47.74±55.32</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>5.</td>
<td>HBA1c (%)</td>
<td>5.91±0.73</td>
<td>6.38±0.78</td>
<td>0.001</td>
</tr>
<tr>
<td>6.</td>
<td>FASTING PLASMA GLUCOSE (mg/dl)</td>
<td>105.48±21.32</td>
<td>134.34±36.35</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>7.</td>
<td>PP (mg/dl)</td>
<td>139.80±40.74</td>
<td>190.63±64.09</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>8.</td>
<td>SYSTOLIC BLOOD PRESSURE (mmHg)</td>
<td>128.16±13.08</td>
<td>137.91±18.21</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>9.</td>
<td>DIASTOLIC BLOOD PRESSURE (mmHg)</td>
<td>80.44±8.51</td>
<td>88.19±11.40</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>10.</td>
<td>TC (mg/dl)</td>
<td>173.06±28.01</td>
<td>227.39±74.32</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>11.</td>
<td>TG (mg/dl)</td>
<td>106.00±34.85</td>
<td>188.09±44.76</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>12.</td>
<td>HDL (mg/dl)</td>
<td>47.04±12.92</td>
<td>55.20±18.69</td>
<td>0.002*</td>
</tr>
<tr>
<td>13.</td>
<td>LDL (mg/dl)</td>
<td>86.52±37.07</td>
<td>141.25±48.54</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>14.</td>
<td>VLDL (mg/dl)</td>
<td>23.92±6.52</td>
<td>43.72±23.48</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>15.</td>
<td>URIC ACID (mg/dl)</td>
<td>5.67±0.95</td>
<td>6.24±0.95</td>
<td>0.001*</td>
</tr>
<tr>
<td>16.</td>
<td>CREATININE (umol/l)</td>
<td>1.04±0.37</td>
<td>1.58±4.10</td>
<td>0.195</td>
</tr>
<tr>
<td>17.</td>
<td>UREA</td>
<td>24.53±6.12</td>
<td>24.22±6.55</td>
<td>0.777</td>
</tr>
</tbody>
</table>

*Statically significant (p value <0.05)

Table 3: Serum Uric Acid (mg/dl)

<table>
<thead>
<tr>
<th>URIC ACID</th>
<th>CONTROLS</th>
<th>PERCENT %</th>
<th>CASES</th>
<th>PERCENT %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;4.0</td>
<td>04</td>
<td>8.0</td>
<td>01</td>
<td>1.0</td>
</tr>
<tr>
<td>4.1-5.0</td>
<td>09</td>
<td>18.0</td>
<td>10</td>
<td>10.0</td>
</tr>
<tr>
<td>5.1-6.0</td>
<td>15</td>
<td>30.0</td>
<td>31</td>
<td>31.0</td>
</tr>
<tr>
<td>6.1-7.0</td>
<td>20</td>
<td>40.0</td>
<td>40</td>
<td>40.0</td>
</tr>
<tr>
<td>&gt;7.0</td>
<td>02</td>
<td>4.0</td>
<td>18</td>
<td>18.0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>50</td>
<td>100.0</td>
<td>100</td>
<td>100.0</td>
</tr>
<tr>
<td>MEAN+SD</td>
<td>5.67±.95</td>
<td>6.24±0.95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graph 1: Comparisson of Serum Uric Acid with Each Component of Metabolic Syndrome

Table 4: Uric Acid with Triglycerides

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases (100)</th>
<th>Controls (50)</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>TG &gt;150</td>
<td>88</td>
<td>50</td>
<td>0.0001</td>
</tr>
<tr>
<td>Mean+SD of Uric Acid</td>
<td>6.31+0.93</td>
<td>5.67+0.95</td>
<td></td>
</tr>
</tbody>
</table>

*Independent sample t test
DISCUSSION

The constellation of metabolic abnormalities including centrally distributed obesity, decreased high-density lipoprotein cholesterol (HDLc), elevated triglycerides, elevated blood pressure (BP), and hyperglycaemia is known as the metabolic syndrome.1 This study has been conducted on the basis of newly approved and widely used definition of metabolic syndrome i.e International Federation of Diabetes (IDF). In India Deepa et al compared the prevalence of MS in southern India and found that, by IDF 25.8% individuals >20 years were having MS as compared to 18.3% by ATP-III.14 In present study, we found that 50% of males in cases and 50% of females in cases as compared to 46% males and 54% females. Sawant A et al15.

Our study revealed a significant increase in serum uric levels in cases (6.24+-0.95) as compared to controls (5.67+-0.95), (p=0.001) corroborates with Ishizaka N et al16, who concluded that the prevalence of metabolic syndrome showed a graded increase along with increasing serum uric acid levels in both sexes (p<0.05).

Hyperuricemia is seen in individuals with insulin resistance because hyperinsulinemia reduces renal excretion of uric acid. In our study there was significant increase in serum uric acid levels when mean of cases (6.27+-0.99) in subjects who has insulin resistance or diabetes was compared to mean of controls(5.67+-0.95), (p=0.0006) which was statically significant. Similar to study by Anthonia O Ogbera et al on Hyperuricaemia and insulin resistance17.

Positive relation between mean serum uric acid and triglycerides (6.31+-0.93) when compared to mean serum uric acid of controls (5.67+-0.95), (p=0.0001), in concordance with ZhenZhen Cai, Xiaofeng Xu et al18 which showed significant relation of uric acid with serum triglycerides (p<0.05). According to Clausen JO et al.19 there is a greater demand for NADPH during synthesis of triglyceride. The synthesis of fatty acids is associated with de novo synthesis of purines, therefore increasing the production of uric acid. When mean serum uric acid & HDL (6.23+-0.94) was compared to mean serum uric acid of controls (5.67+-0.95), There was a positive relation with HDL levels (p=0.007), similar to study of Ahoud F. Al Meshaweh et al20, showing similar results (p<0.05).

A positive relation was shown , when serum uric acid was compared with blood pressure, the mean of uric acid for cases (6.17+-0.94) who’s BP was more than 130/85 according to the IDF criteria was compared to mean of uric acid for controls (5.67+-0.95), which resulted as significant (p=0.006). Linc. KC, S.D, et al21 who showed increase levels of uric acids with blood pressure (p<0.001).

There is also a co-relation of levels of serum uric acid with glycemia, in our study the mean of fasting plasma glucose(6.27+-0.99) was compared with mean of uric acid for controls (5.67+-0.95) which resulted in significant results (p=0.0006).

### Table 5: Uric Acid with HDL

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases (100)</th>
<th>Controls (50)</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDL Males&lt;40, Females&lt;50</td>
<td>37</td>
<td>50</td>
<td>0.007</td>
</tr>
<tr>
<td>Mean+SD of Uric Acid</td>
<td>6.23+-0.94</td>
<td>5.67+-0.95</td>
<td></td>
</tr>
</tbody>
</table>

*Independent sample t test

### Table 6: Uric Acid with Blood Pressure

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases (100)</th>
<th>Controls (50)</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Pressure &gt;130/85</td>
<td>62</td>
<td>50</td>
<td>0.006</td>
</tr>
<tr>
<td>Mean+SD of Uric Acid</td>
<td>6.17+-0.94</td>
<td>5.67+-0.95</td>
<td></td>
</tr>
</tbody>
</table>

*Independent sample t test

### Table 7: Uric Acid with Fasting Plasma Glucose

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases (n100)</th>
<th>Controls (50)</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting plasma glucose &gt;100 or IGT</td>
<td>88</td>
<td>50</td>
<td>0.0006</td>
</tr>
<tr>
<td>Mean+SD of Uric Acid</td>
<td>6.27+-0.99</td>
<td>5.67+-0.95</td>
<td></td>
</tr>
</tbody>
</table>

*Independent sample t test

### Table 8: URIC ACID AND OBESITY

<table>
<thead>
<tr>
<th>Variables</th>
<th>Cases(n 100)</th>
<th>Controls(50)</th>
<th>P value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Obesity Males&gt;90</td>
<td>100</td>
<td>50</td>
<td>0.0006</td>
</tr>
<tr>
<td>Females &gt;80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean+SD of Uric Acid</td>
<td>6.24+-0.95</td>
<td>5.67+-0.95</td>
<td></td>
</tr>
</tbody>
</table>

*Independent sample t test
which matched the results of a study conducted by Qin Li et al.\textsuperscript{1,23} showing a positive relation between hyperglycemia and uric acid (P<0.001).

Central obesity, had a significant relation between uric acid and central obesity, the mean value of central obesity (6.24±0.95) as compared to mean value of uric acids (5.67±0.95) showed a significant result (P =0.0006) similar S.D Lin et al\textsuperscript{24} showing significant increase in uric acid when compared to obesity or waist circumference (P<0.001). In the study conducted, on 100 patients of metabolic syndrome, 18 patients had clear evidence of hyperuricemia ie uric acid level was more than 7mg/dl. Hyperuricemia is a risk marker for coronary artery disease, these 18 patients are at risk for coronary artery disease and such patients should be repeatedly, periodically, evaluated for coronary artery disease. Similar to study conducted by Kim SY, Albert DA et al., that hyperuricemic patients (in which uric acid is above desirable range) are at risk of coronary artery disease.\textsuperscript{25}

Therefore the study has shown a significant relation between serum uric acid and components of metabolic syndrome.

**SUMMARY & CONCLUSION**

- The study was done in the department of medicine, Santosh Medical College and Hospitals, Ghaziabad (U.P) over a period August 2012 to July 2013.
- The aim was to study role of uric acid in metabolic syndrome.
- It is a prospective case control study.
- Total number of patients enrolled in the study was 100 as cases and 50 as controls.
- The majority of patients were in there 5\textsuperscript{th} to 6\textsuperscript{th} decade of life.
- The data was collected and findings and comparison was analysed and tabulated.
- It was seen that when the components of metabolic syndrome are compared with uric acid the results are significant.
- It was seen when triglycerides, HDL, Fasting plasma glucose, Blood Pressure and Obesity was compared to mean of uric acid of controls, results was significant.[ TG 6.31±0.93, controls 5.67±0.95, p=0.0001; HDL 6.23±0.94, controls 5.67±0.95, p=0.007; Blood Pressure 6.17±0.94, controls 5.67±0.95 p=0.006, Fasting plasma glucose 6.27±0.99, controls 5.67±0.95, p=0.0006; Obesity 6.24±0.95, controls 5.67±0.95, p=0006].

If uric acid levels are elevated it should therefore be regarded as a ‘red flag’ and appropriate approach should be attempted to obtain the risk reduction. Serum uric acid may or may not be an independent risk factor especially since its linkage to other risk factors is so strong.

From the present study it is concluded that:
1. There is a positive association between uric acid and metabolic syndrome.
2. There is a positive correlation between individual components of metabolic syndrome with Uric acid.
3. Hyperuricemia should be considered as a component of metabolic syndrome and risk factor for cardiovascular diseases.

A quote by Johnson RJ and Tuttle KR is appropriate for concluding:
‘The bottom line is that measuring uric acid is a useful test for a clinician, as it carries important prognostic information. An elevation of uric acid is associated with an increase risk for cardiovascular disease and mortality.’

**Acknowledgement:** None

**Conflict of Interest:** None

**Source of funding:** None

**Ethical Committee:** Permission taken

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PREVELANCE OF EATING DISORDERS, SUBSTANCE ABUSE AND DEPRESSION AMONG UNDERGRADUATE GIRLS

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ABSTRACT:
Eating disorders are mental illnesses that cause serious disturbances in a person’s everyday diet. A person with an eating disorder may go to great lengths to hide, disguise or deny their behaviour, or do not recognize that there is anything wrong. Substance abuse is a patterned use of a substance (drug) in which the user consumes the substance in amounts or with methods which are harmful to themselves or others. Depending on the actual compound, drug abuse may lead to health problems, social problems, morbidity, injuries, unprotected sex, violence, deaths, motor vehicle accidents, homicides, suicides, physical dependence or psychological addiction Depression is a common mental disorder, characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness and poor concentration.

The current investigation was designed to study the prevalence of eating disorders, substance or drug abuse and depression among the undergraduate girls and the interrelationship between eating disorder, substance abuse and depression. The sample for current investigation consisted of 80 college students from post graduate Government college for girls, sector-11, Chandigarh (where 40 are day-scholars and 40 are hostellers) in the age group of 17-23 years. For this purpose, the Eating Attitude Scale, Drug Abuse Screening Test and Beck Depression Inventory were administered to the sample. Inter-correlational analysis was used for the statistical analysis. Eating disorder and substance use are found to be positively related with depression. Results will be discussed along with the implications.

INTRODUCTION

EATING DISORDERS
Eating disorders often begin with the best of intentions, a desire to lose weight and control eating. But in some people, those good intentions go badly wrong, resulting in anorexia nervosa, bulimia, binge eating, or other disorders. A person with an eating disorder may have disturbed eating behaviours coupled with extreme concerns about weight, shape, eating and body image. These disorders frequently coexist with other mental illnesses such as depression, substance abuse, or anxiety disorders. Eating disorders can be classified into different categories:

- Anorexia nervosa- is characterized by extreme thinness (emaciation), a relentless pursuit of thinness and unwillingness to maintain a normal or healthy weight, intense fear of gaining weight, distorted body image, perception influenced self-esteem, lack of menstruation among girls and women, restricted eating and denial of extremely low body weight.

- Bulimia nervosa- is characterized by recurrent and frequent episodes of eating unusually large amounts of food and feeling a lack of control over these episodes. This binge-eating is followed by behavior that compensates for the overeating such as forced vomiting, excessive use of laxatives or diuretics, fasting, excessive exercise, or a combination of these behaviors.

- Binge-eating disorder- a person loses control over his or her eating. Unlike bulimia nervosa, periods of binge-eating are not followed by purging, excessive exercise, or fasting. As a result, people with binge-eating disorder often are over-weight or obese. They also experience guilt, shame, and distress about their binge-eating, which can lead to more binge-eating.

Set point is the weight range in which your body is programmed to weigh and will fight to maintain that weight. Set-point theory refers to the weight a person maintains and returns to after dieting or overfeeding. Set-point varies with age and activity levels, and may be raised if the person is subject to chronic deprivation. Set point theory can be brought into play to determine a healthy target weight for full weight restoration.

AIM
The present investigation aims to study the prevalence of eating disorders, drug use and depression among the undergraduate college students and the interrelationship between eating disorder, substance abuse and depression.

SUBSTANCE ABUSE
Substance use means using one or many psychoactive substances without giving rise to health or behavioural problems that might harm users themselves or anyone else. Substance use is common among teenagers and young adults who may experiment with a psychoactive substance, out of...
curiosity, for the fun of it, or because of peer pressure\textsuperscript{10}. Most of the time, this use seems to stop there, without escalating to increased use. Substance use becomes substance abuse when it impairs the user’s physical or psychological health, aggravates certain illnesses, or even causes premature death. Substance abuse means using psychoactive substances in a way that may cause physical, psychological, economic, legal, or social harm to users themselves or to people directly or indirectly associated with them\textsuperscript{1,12}.

According to the Ego/Self theory of Substance Dependence\textsuperscript{13}, drug dependence is tied intimately to an individual’s attempt to cope with his or her internal emotional and external social and physical environment. Drug dependency can best be understood by examining how such a person’s ego organization and sense of self serve or fail the individual’s attempts to cope, and how the specific effects of various substances facilitate or impede such attempts\textsuperscript{14}.

According to the Theory of Drug Use\textsuperscript{15}, disturbance in the normally expected mastery of phase-specific conflicts during early childhood may induce severe primitive psychopathologies, the addictions being prominent among these. Failure to cope adequately with the rage, overstimulation, and disorganized sensory input of such experiences leaves residual sensory overload and disorganization\textsuperscript{16}. The drug user is hypothesized to achieve relief via the specific altered ego states induced by psychotropic drugs. The drug of choice will be the pharmacologic agent that proves harmonious with the user’s characteristic mode of reducing stress\textsuperscript{13}. The user’s drug of choice appears to produce an altered ego state which is reminiscent of and may recapture specific phases of early child development\textsuperscript{11}.

**DEPRESSION**

Depression is not uniform. A general feeling of pessimism sets in as the person feels hopeless, restless, irritated, have disturbed sleep patterns, body aches, suicidal thoughts and eating habits. Depression is different from feeling down or sad\textsuperscript{16}. Unhappiness is something which everyone feels at one time or another, usually due to a particular cause\textsuperscript{17}. A person suffering from depression will experience intense emotions of anxiety, hopelessness, negativity and helplessness, and the feelings stay with them instead of going away\textsuperscript{18}. Depression can happen suddenly as a result of physical illness, experiences dating back to childhood, unemployment, bereavement, family problems or other life-changing events. Pituitary damage, a treatable condition which frequently follows head injuries, may also lead to depression\textsuperscript{19,20}. Sometimes, there may be no clear reason for your depression but, whatever the original cause, identifying what may affect how you feel and the things that are likely to trigger depression is an important first step. There are several forms of depressive disorders\textsuperscript{21,22}:

- **Major depressive disorder (major depression)** – the patients suffer from a combination of symptoms that undermine their ability to sleep, study, work, eat, and enjoy activities they used to find pleasurable\textsuperscript{23}.
- **Dysthymic disorder (dysthymia or mild chronic depression)** – the patients suffer from a combination of symptoms for a long time. The symptoms do not disable the patient, but they may find it hard to function normally and feel well\textsuperscript{24}.
- **Psychotic depression (delusional depression)** – a person with severe depression along with some form of psychosis, such as having disturbing false beliefs or a break with reality (delusions), or hearing or seeing upsetting things that others cannot hear or see (hallucinations)\textsuperscript{25}.
- **Postpartum depression (postnatal depression)** – which is much more serious than the "baby blues" that many women experience after giving birth, when hormonal and physical changes and the new responsibility of caring for a newborn can be overwhelming\textsuperscript{26}.
- **SAD (seasonal affective disorder)** – which is characterized by the onset of depression during the winter months, when there is less natural sunlight. The depression generally lifts during spring and summer\textsuperscript{27}.
- **Bipolar disorder (manic-depressive illness)** – is characterized by cycling mood changes from extreme highs (e.g., mania) to extreme lows (e.g., depression)\textsuperscript{28}.

According to Object relations theory, depression is caused by problems people have in developing representations of healthy relationships. Depression is a consequence of an ongoing struggle that depressed people endure in order to try and maintain emotional contact with desired objects\textsuperscript{29}. There are two basic ways that this process can play out: the anaclitic pattern, and the introjective pattern. Anaclitic depression is caused by the disruption of a care giving relationship with a primary object and is characterized by feelings of helplessness and weakness. Introjective depression arises from a harsh, unrelenting, highly critical superego that creates feelings of worthlessness, guilt and a sense of having failure leading to intense fears of loss of love from a desired object\textsuperscript{30}. 

Aparajita Sharma  
Prevalence of Eating Disorders, Substance Abuse and Depression Among Undergraduate Girls
HYPOTHESES
1. It is expected that there will be a positive relationship between Eating Disorders and Substance Use among day scholar and hostellers.
2. It is expected that there will be a positive relationship between Substance Use and Depression among day scholar and hostellers.
3. It is expected that there will be a positive relationship between Eating Disorders and Depression among day scholar and hostellers.
4. It is expected that the tendency of Eating Disorders would be high among hostellers as compared to day scholars.
5. It is expected that the tendency of Substance Use would be high among the hostellers as compared to day scholars.
6. It is expected that the tendency of Depression would be high among hostellers as compared to day scholars.

METHODOLOGY
The purpose of the current investigation is to study the prevalence of eating disorders, substance abuse and depression among undergraduate girls and the interrelationship of eating disorders, substance use and depression. For this purpose, Eating Attitude Scale, Drug Abuse Screening Test and Beck Depression Inventory were administered to the sample.

The Eating Attitude Scale is a standardized self-report measure of symptoms and characteristic of eating disorders. The original 40-item version of the EAT, examined the socio-cultural factors in the development and maintenance of eating disorders A 1982 publication by Garner and colleagues described a 26-item refinement of the original test. The test is rated on a six-point scale in response to how often the individual engages in specific behaviors. The questions may be answered: Always, Usually, Often, Rarely, Sometimes, and Never. Individuals who score 20 or more on the test should be interviewed by a qualified professional to determine if they meet the diagnostic criteria for an eating disorder. The EAT-26 is not designed to make a diagnosis of an eating disorder or to take the place of a professional diagnosis or consultation. The EAT-26 has been particularly useful a screening tool to assess eating disorder risk in high school, college and other special risk samples.

Drug Abuse Screening Test was designed to provide a brief instrument for clinical screening and treatment evaluation research. It is a 28-item face valid self-report measure of problematic substance use that is utilized for clinical screening and treatment/evaluation research. Responses to the DAST are given as binary (yes/no) items, each valued at one point, yielding a total score ranging from 0 to 28. A cutoff score of 6 is generally used to indicate drug abuse or dependence problem.

Beck Depression Inventory is a 21-question multiple-choice self-report inventory, for measuring the severity of depression. The questionnaire is designed for individuals aged 13 and over, and is composed of items relating to symptoms of depression such as hopelessness and irritability, cognitions such as guilt or feelings of being punished, as well as physical symptoms such as fatigue, weight loss, and lack of interest in sex etc. There are three versions of the BDI—the original BDI, first published in 1961 and later revised in 1978 as the BDI-1A, and the BDI-II, published in 1996. For the current investigation BDI (1961) was used.

The sample for the current investigation comprised of 80 undergraduate girls, further divided into 40 day-scholars and 40 hostellers. The age group of the sample was 17-23 years. The sample was collected from Post Graduate Government College for Girls, Chandigarh. The participants were given specific instructions for the three tests. The results are discussed further and are presented in a tabular pattern.

RESULTS

TABLE 1: Correlation matrix between eating disorders, substance abuse and depression among day scholar.

<table>
<thead>
<tr>
<th></th>
<th>EATING DISORDERS</th>
<th>SUBSTANCE ABUSE</th>
<th>DEPRESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EATING DISORDERS</td>
<td>-</td>
<td>0.271</td>
<td>0.398</td>
</tr>
<tr>
<td>SUBSTANCE ABUSE</td>
<td>-</td>
<td>-</td>
<td>0.118</td>
</tr>
<tr>
<td>DEPRESSION</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

TABLE 2: Correlation matrix between eating disorders, substance abuse and depression among hostellers

<table>
<thead>
<tr>
<th></th>
<th>EATING DISORDERS</th>
<th>SUBSTANCE ABUSE</th>
<th>DEPRESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>EATING DISORDERS</td>
<td>-</td>
<td>0.641</td>
<td>0.628</td>
</tr>
<tr>
<td>SUBSTANCE ABUSE</td>
<td>-</td>
<td>-</td>
<td>0.4252</td>
</tr>
<tr>
<td>DEPRESSION</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
DISCUSSION

The primary objective of the current investigation was to study the prevalence of eating disorders, substance abuse and depression among undergraduate girls and the interrelationship of eating disorders, substance use and depression. The results are in accordance to the proposed hypotheses.

Hypothesis 1 stated that there will be a positive relationship between Eating Disorders and Substance Use. The correlation value came out to be 0.27 for day scholars and 0.64 for hostellers, which is not significant. However, a study reported that 68% of the students using various substances. Out of these, 138 were males and 66 females. The common substance used by the students was tobacco products (n=124, 41.4%) followed by sedatives (n= 44, 14.7%) and alcohol (n=20, 6.7%). Out of 152 students residing in hostels, 91 were using substances compared to 63 out of 148 day scholars.

An investigation designed to examine the role of gender and residence on the mental health of college students suggests that girls have many mental disorders such as mood, Anxiety, depression and eating disorders. In the hostel students may face the problems within the hostel as well as in the college because of lack of satisfactory support. Fresh Hostel students indicated more depressive symptoms than day scholars.

According to hypotheses 2 it is expected that there will be a positive relationship between Substance Use and Depression among day scholar and hostellers. The correlation value for day scholars came out to be 0.19 in comparison to 0.42 for hostellers, which is not significant. According to the studies, substance use has been linked to some kind of emotional distress prior to consumption. In a sample of young Americans, Shedler and Block observed that marijuana users had more emotional problems during childhood. In the same vein, in a 5-year longitudinal study of adolescents, Lerner and Vicary observed the relation between a difficult temperament, including frequent negative moods and social isolation, and the initiation and continuance of substance use. Moods and negative responses to isolation by difficult children could be similar to the depression and social alienation often expressed by substance users.

Ramana examined the prevalence of depression among girls of residential college hostels. The sample consists of 315 students pursuing intermediate, graduate and postgraduate education. The major findings of the study indicate that depression among girl students seems to be dependent on the course they are studying and the back background from which they have come. The depressed students experience more self-pity and loneliness and have more adjustment problems related to emotions, health, academic matters and have more adjustment problems related to emotions, health, academic matters and social situations than non depressed students. As a result they are more prone to substance use and abuse.

A study showed that more proportion of male students had depression than female students. But, the highest mean depression score found among females and lowest mean depression score found among males. This difference in proportion of depression among respondent according to gender in this study was not statistically significant. The findings was in contrast to the findings of other studies where they found rates of depression among female hostel students two times higher as shown by significantly more than their male counterpart as shown by other studies. Male students in our study had more depressive symptoms, which may be due to their more competitiveness and future planning, less adjustment in the hostel atmosphere as the study found that male hostellers had more mean BDI score than day scholars.

Hypotheses 3 stated that there will be a positive relationship between Eating Disorders and Depression among day scholar and hostellers. The correlation came out to be 0.40 for day scholars and 0.63 for hostellers, which is not significant. According to a study, the anxiety and depression scores were significantly more in female hosteller students two times higher as shown by other studies. Male students in our study had depression than female students. This difference in proportion of depression among respondent according to gender in this study was not statistically significant. The findings was in contrast to the findings of other studies where they found rates of depression among female hostel students two times higher as shown by significantly more than their male counterpart as shown by other studies. Male students in our study had more depressive symptoms, which may be due to their more competitiveness and future planning, less adjustment in the hostel atmosphere as the study found that male hostellers had more mean BDI score than day scholars.

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Perrin et al. in their study, examined the impact of thinness-emphasizing and thinness-promoting messages disseminated by mass media and running specific media, and how those messages affected disordered eating among female collegiate students. Multiple psychological, environmental, and sociological factors combine in the development of low self-esteem, which is widely regarded as the dominant premorbid personality trait. Depression or other forms of psychopathology, disturbed family relationships, and adverse experiences may also trigger its onset. Hostellers are already more prone to depression and eating disorders, and media utilizes that influence to perpetuate the problem rather than to prevent or mitigate it.

Hypotheses 4 stated that the tendency of Eating Disorders would be high among hostellers as compared to day scholars. The t-ratio value for eating disorders came out to be 0.08. However, the result is not significant. But the direction of the mean indicates that hostellers (mean=24.02) are high on eating disorders as compare to the day scholars (mean=21.31). A study on women aged 20-25 years and residing in professional college hostels succeeded in finding suspected cases of Eating Disorders. The study was conducted in professional college hostels where lifestyle of women has an impact on their perceptions of appearance, their eating habits, and schedule.

The Multi-Service Eating Disorders Association (MEDA) cites that 15% of women aged 17 to 24 have eating disorders, 40% of female college students have eating disorders. 91% of female college students have attempted to control their weight through dieting. According to one study on college student eating disorders, 5% to 20% of college females and 1% to 7% of college males have eating disorders.

In a survey of 185 female students on a college campus, 58% felt pressure to be a certain weight, and of the 83% that dieted for weight loss, 44% were of normal weight. 91% of women surveyed on a college campus had attempted to control their weight through dieting, 22% dieted often or always, 6% report onset of eating disorder by age 20, 43% report onset between ages of 16 and 20. Anorexia is the third most common chronic illness among adolescents, 95% of those who have eating disorders are between the ages of 12 and 25, 25% of college-aged women engage in bingeing and purging as a weight-management technique. Hotellers are much more likely than men to develop an eating disorder because of their dissatisfaction, irritability, hopelessness, lifestyle, personality, beliefs, distance from home etc.

Hypotheses 5 expected that the tendency of Substance Use would be high among the hostellers as compared to day scholars. The t-ratio value for substance use came out to be 2.08* which is significant at 0.05 level. The review of literature supports the obtained results. Jensen and Overgaard reported that as compared to boarders, hotellers bear high risk of adapting unhealthy habits. Research findings had proved that there is a positive association between factors relating to residential condition, status and children's unhealthy personality.

Terry conducted study on hostel upbringing on personality and adjustment activities and found that environmental aspect of a hostel has an effect on the adjustment skills and ability. The effect of homesickness on mental processes, results into symptoms such as loss of attentiveness, loss of interest, loneliness. The easy availability of substances can increase the tendency of misuse. So the hostellers are more prone to substance use due to factors like availability of resources, lack of constant check, adjustment problems, competition, distant parenting etc.

Hypotheses 6 expected that the tendency of Depression would be high among hostellers as compared to day scholars. A study showed that hostellers had more depressive symptoms, reason of which might be due to the quality of food in the hostels, lack of entertainment, feeling of loneliness. The most common reasons for students misusing drugs were peer pressure (96%), academic stress (90%), curiosity for experimentation (89%) and "to get high" (88%), family conflicts, school and mental problems (40%) . Of note, not only was academic stress the second most commonly cited reason, it was also the second most common reason deemed to justify drug intake.

The main problem of students related to their mental health are depression, bipolar disorder, eating disorders and addictions, primarily to Drugs or alcohol and well being. McLennan reported that students have higher levels of anxiety and depression than general communities. College students are at an increased risk of development disadvantage and significant issue in college and universities. Hostel rules and regulation affect the student physical and mental health. College hostel students show higher levels of Perceived stress, depression and anxiety, high level of perceived stress is responsible to poor adjustment in academic campus and interpersonal relations.

**IMPLICATION OF THE PRESENT STUDY**

In the present study, we have ascertained the prevalence of eating disorders, substance abuse and depression among undergraduate girls. While there are certainly growing concerns over other mental health issues affecting college students today the prevalent issues of depression, anxiety, suicide, eating disorders, addiction, substance use and abuse need more awareness. It is important to take mental health seriously and address the issues effectively.
health seriously and to seek help if you think if at risk. The students need to be guided properly in order to channelize their energies in a constructive. Parents and teachers should make sure that educational years of adolescents are free from stress and emotional tensions, and should encourage them for the best of their potentials. So, proper emphasis is needed to make the adolescent emotionally intelligent, develop a sense of coherence and have a sound psychological well being. Being a college student can be a difficult balancing act. It is easy to get weighed down with the pressures of academics, social life, and choosing a career. The first step towards change is awareness and the second step is acceptance. The key to growth is the introduction of higher dimensions of consciousness into our awareness. So, proper guidance is needed to reduce the prevalence rate of depression, eating disorders and substance use among college students to develop a healthy lifestyle and psychological well being.

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GREEN DENTISTRY “WAYS TO GO GREEN AT THE DENTAL OFFICE”

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ABSTRACT

Proper handling of biomedical and dental waste management is an essential responsibility for the dental profession. This can be achieved by reducing waste, improving efficiency and lowering pollution. A green dental office can use reusable towels, biodegradable cleaners and high efficiency machines. The office should have an environmentally sustainable method of disposing of toxic waste. It can also use papaerless records to lower its paper consumption. All of these steps will make the overall impact of the dentist office less damaging to the environment.

INTRODUCTION

Environment pollution is the burning topic today in the world. Pollution shows health hazards in human being, animals and aquatic life. Directly or indirectly every human being is responsible for this, and the dentistry is not an exception for this.1

Hospital waste is not only infectious but also hazardous and contributes significantly to environment pollution.2 It is ironical that we as dental professionals, providing dental care in hospitals, clinics that bring relief to the sick can create health hazards due to improper management of waste generated in those places.3 Take the green route is the motto of this century. The need of the hour is to develop product or by products that can be recycled. Thus, the preferred method of disposal for many consumer and industrial waste streams (paper, wood, plastic, metals, chemicals etc.) is recycling.

In most industrial setting, including professional such as dentistry most heavy metals like elemental mercury and silver can be easily collected and recycled. If not to be recycled, these metals must be disposed of as hazardous waste.4

CLASSIFICATION5

NON-HAZARDOUS WASTE:

This constitutes about 85% of the waste generated in most healthcare set-ups. This includes waste comprising of food remnants, fruit peels, wash water, paper cartons, packaging material etc.

HAZARDOUS WASTE:

(A). POTENTIALLY INFECTIOUS WASTE:

Over the years different terms for infectious waste have been used in the scientific literature in regulation and in the guidance manuals and standards. Those include infectious, infective, medical, biomedical, hazardous, red bag, contaminated, medical infections, and regulated medical waste. All these terms indicate basically the same type of waste, although the terms used in regulations are usually defined more specifically.6 It includes.

1. Dressings and swabs contaminated with blood, pus and body fluids.
2. Laboratory waste including laboratory culture stocks of infectious agents.
3. Potentially injected material. Excised tumours and organs, extracted teeth etc.
4. Potentially infected animals used in diagnostic and research studies.
5. Sharps which include needle, syringes blades etc.
6. Blood and blood products5

(B). POTENTIALLY TOXIC WASTE:

1. Radioactive waste: Includes waste contaminated with radionuclide;
2. Chemical waste: It include disinfectants (hypochlorite, gluteraldehyde, iodophors, phenolic derivatives and alcohol based preparation), X-Ray processing solutions, monomers and associated reagents, base metal debris(dental amalgam in extracted teeth).
3. Pharmaceutical waste: It includes anesthetics, sedative, antibiotic and analgesics etc.

1. DENTAL WASTE OF ENVIRONMENTAL CONCERN:

1. Amalgam: Dental amalgam particles are a source of mercury, which is known to be nuerotoxic and nephrotoxic.8 Mercury vapor or elemental mercury, is the most significant form for the dentist’s and patients health care concerns.

Precautions during preparing placement of Amalgam:

1. Instead of manual manipulations only precapsulated amalgam always should be used.
2. The capsules should be recapped after use and stored in closed containers for recycling.
3. Avoid skin contact with mercury or freshly mixed amalgam.
4. High-volume evacuation systems must be employed during finishing or removing amalgam restoration.
5. After condensation, the scrap should be collected and stored in water, glycerine or X-Ray fixer in a tightly capped jar (almost filled with liquid to reduce the space where mercury can collect).
6. Rubber dams, high volume evacuation and water cooling should be used to reduce the vapor released during removal of old amalgam restorations.
7. Amalgam scrap should be disposed of as hazardous waste or should be sent to a recycler. Waste mercury is disposed similarly.
8. Since amalgam decomposes on heating; amalgam scrap should not be disposed in the waste that could eventually be incinerated.9

2. X-RAY WASTES:
(a) X-Ray fixer solutions: is considered hazardous waste because of high silver content. It has to be disposed off as a hazardous waste or sent to silver recovery systems.
(b) Developer solutions can go into waste water drain. X-Ray developer fixer should not be mixed. If mixed they should be separated and treated independently.
(c) X-Ray lead foil/shields: Lead foils and shields contain pure lead. Lead is treated as hazardous waste or recycled for scrap metal content. Dentists can use digital X-Ray equipment, which eliminates need for processing chemicals. In addition, digital X-Ray’s reduce patient radiation exposure.10

3. PLASTICS: Disposable syringes, bottles, surgical gloves are examples of plastics used in dental clinic. Once hailed as a wonder natural plastic is now a serious environmental and health concern due to its non-biodegradable nature. Burning of plastics releases carcinogens like dioxin and furan. Designing eco-friendly, biodegradable plastics are the need of the hour.

4. BLOOD-SOAKED MATERIALS: must not be discarded with regular garbage. They should be separated from other wastes, collected in yellow liner and stored for fewer than 4 days. For any longer, the material must be refrigerated (below 4°C). Once a certain amount has been collected, a biomedical against waste carrier must be contacted for disposal.

5. DENTAL LABORATORY WASTE: like disposable treys or impression materials may be considered general waste and treated accordingly.

6. DISPOSAL OF SHARPS: like burns, blades, orthodontic wires should be done in puncture resistant containers.
   - Black bags should be used for non-risk waste and can be transported to a land-fill. Red bags are used for disposing sharps, tubing, gloves blood bags, plastic bottles, syringes etc.
   - Yellow bags are used for waste with significant health care risk, such as human waste, cotton, extracted teeth etc.
   - Blue bags are used for blades medicine vials/ampules or glass bottles etc.

CONCLUSION
Lack of knowledge and increased cost of waste management are important issues that impend waste management. A student initiation for environmentally responsible dental practice should start from dental educations stage only, so that awareness of disposal of dental waste can be carried out in future. Dentists have power to create a cleaner, greener planet for future generations.

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DOMESTIC VIOLENCE IN CHILDREN – WHAT LIES BEHIND THE DOOR?*

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ABSTRACT
Domestic violence is a devastating social problem that affects every segment of the population. While system responses are primarily targeted towards adult victims of abuse, increasing attention is now focused on the children who witness domestic violence. Many times children suffer silently, and with little support. It is a problem of major public concern and has gained wide attention among paediatricians, dentists, psychiatrists, social workers, forensic pathologists, and professionals. This article reports the oral and dental aspects of physical and sexual abuse and dental neglect and the role of physicians and dentists in evaluating such conditions.

Keywords: domestic violence, assault

INTRODUCTION
Domestic violence measured by the National Crime Victimization Survey (NCVS) includes rape or sexual assault, robbery, and aggravated and simple assault committed by a current or former spouse, boyfriend, or girlfriend. In 2000, about 1 in every 200 households acknowledged that someone in the household experienced some form of domestic violence. There is no statistically significant difference in this rate over the prior 6 years. As with other crimes measured using the NCVS, a household counted as experiencing domestic violence was counted only once, regardless of the number of times that a victim experienced violence and regardless of the number of victims in the household during the year.

The purpose of this report is to review the oral and dental aspects of physical and sexual abuse and dental neglect and the role of physicians and dentists in evaluating such conditions.

Children’s exposure to domestic violence typically falls into three primary categories

- Hearing a violent event;
- Being directly involved as an eyewitness, intervening, or being used as a part of a violent event (e.g., being used as a shield against abusive actions);
- Experiencing the aftermath of a violent event.

Also, Tactics- The types of domestic violence actions perpetrated by abusers include physical, sexual, verbal, emotional, and psychological tactics; threats and intimidation; economic coercion; and entitlement behaviors. Children’s exposure to domestic violence also may include being used as a spy to interrogate the adult victim, being forced to watch or participate in the abuse of the victim, and being used as a pawn by the abuser to coerce the victim into returning to the violent relationship. Some children are physically injured as a direct result of the domestic violence. Some perpetrators intentionally physically, emotion-ally, or sexually abuse their children in an effort to intimidate and control their partner. While this is clearly child maltreatment, other cases may not be so clear. Children often are harmed accidentally during violent attacks on the adult victim. An object thrown or weapon used against the battered partner can hit the child. Assaults on younger children can occur while the adult victim is holding the child, and injury or harm to older children can happen when they intervene in violent episodes. In addition to being exposed to the abusive behaviour, many children are further victimized by coercion to remain silent about the abuse, maintaining the “family secret.”

Physical abuse
Craniofacial, head, face, and neck injuries occur in more than half of the cases of child abuse. A careful and thorough intraoral and perioral examination is necessary in all cases of suspected abuse and neglect. In addition, all suspected victims of abuse or neglect, including children in state custody or foster care, should be examined carefully not only for signs of oral trauma but also for caries, gingivitis, and other oral health problems. Some authorities believe that the oral cavity may be a central focus for physical abuse because of its significance in communication and nutrition.

Oral injuries may be inflicted with instruments such as eating utensils or a bottle during forced feedings, hands, fingers, or scalding liquids or caustic substances.

The abuse may result in: contusions, burns, or lacerations of the tongue, lips, buccal mucosa, palate (soft and hard), gingiva alveolar mucosa, or
frenum; fractured, displaced, or avulsed teeth; or facial bone and jaw fractures\textsuperscript{12}. 

In one study, the lips were the most common site for inflicted oral injuries (54\%), followed by the oral mucosa, teeth, gingivae, and tongue. Discoloured teeth, indicating pulpal necrosis, may result from previous trauma.\textsuperscript{13,14} Gags applied to the mouth may result in bruises, lichenification, or scarring at the corners of the mouth.\textsuperscript{15}

Some serious injuries of the oral cavity, including posterior pharyngeal injuries and retropharyngeal abscesses, may be inflicted by caregivers with factitious disorder by proxy\textsuperscript{16} to simulate haemoptysis or other symptoms requiring medical care; regardless of caregiver motive, all inflicted injuries should be reported for investigation. Unintentional or accidental injuries to the mouth are common and must be distinguished from abuse by judging whether the history, including the timing and mechanism of injury, is consistent with the characteristics of the injury and the child’s developmental capabilities. Multiple injuries, injuries in different stages of healing, or a discrepant history should arouse a suspicion of abuse. Consultation with or referral to a knowledgeable dentist may be helpful.

Sexual abuse

Although the oral cavity is a frequent site of sexual abuse in children,\textsuperscript{17} visible oral injuries or infections are rare. When oral-genital contact is suspected, referral to specialized clinical settings equipped to conduct comprehensive examinations is recommended. The American Academy of Pediatrics statement “Guidelines in the Evaluation of Sexual Abuse of Children”\textsuperscript{18} provides information regarding these examinations.

Oral and perioral gonorrhoea in prepubertal children, diagnosed with appropriate culture techniques and confirmatory testing, is pathognomonic of sexual abuse\textsuperscript{19} but rare among prepubertal girls evaluated for sexual abuse.\textsuperscript{20} Pharyngeal gonorrhoea is frequently asymptomatic.\textsuperscript{21}

When oral-genital contact is confirmed by history or examination findings, universal testing for sexually transmitted diseases within the oral cavity is controversial; the clinician should consider risk factors (e.g., chronic abuse, perpetrator with a known sexually transmitted disease) and the child’s clinical presentation in deciding whether to conduct such testing. Although human papillomavirus infection may result in oral or perioral warts, the mode of transmission remains uncertain and debatable. Human papillomavirus infections may be sexually transmitted through oral-genital contact, vertically transmitted from mother to infant during birth, or horizontally transmitted through nonsexual contact from a child or caregiver’s hand to the genitals or mouth.\textsuperscript{22}

Unexplained injury or petechiae of the palate, particularly at the junction of the hard and soft palate, may be evidence of forced oral sex.\textsuperscript{23} As with all suspected child abuse or neglect, when sexual abuse is suspected or diagnosed in a child, the case must be reported to child protective services and/or law enforcement agencies for investigation.\textsuperscript{22,23} A multidisciplinary child abuse evaluation for the child and family should be initiated.

Children who present acutely with a recent history of sexual abuse may require specialized forensic testing for semen and other foreign materials resulting from assault. If a victim provides a history for oral-penile contact, the buccal mucosa and tongue can be swabbed with a sterile cotton-tipped applicator, then the swab can be air-dried and packaged appropriately for laboratory analysis. However, specialized hospitals and clinics equipped with protocols and experienced personnel are best suited for collecting such material and maintaining a chain of evidence necessary for investigations.\textsuperscript{18,20}

Bite marks

Acute or healed bite marks may indicate abuse. Dentists trained as forensic odontologists can assist physicians in the detection and evaluation of bite marks related to physical and sexual abuse.\textsuperscript{22} Bite marks should be suspected when ecchymoses, abrasions, or lacerations are found in an elliptical or ovoid pattern. Bite marks may have a central area of ecchymoses (contusions) caused by two possible phenomena: positive pressure from the closing of the teeth with disruption of small vessels or negative pressure caused by suction and tongue thrusting. Bites produced by dogs and other carnivorous animals tend to tear flesh, whereas human bites compress flesh and can cause abrasions, contusions, and lacerations but rarely avulsions of tissue. An intercanine distance (i.e., the linear distance between the central point of the cuspid tips) measuring more than 3.0 cm is suspicious of an adult human bite.\textsuperscript{23}

The pattern, size, contour, and colour of the bite mark should be evaluated by a forensic odontologist or a forensic pathologist if an odontologist is not available. If neither specialist is available, a physician or dentist experienced in the patterns of child abuse injuries should observe and document the bite mark characteristics graphically with an identification tag and scale marker (eg, ruler) in the photograph. The photograph should be taken such that the angle of the camera lens is directly over the bite and perpendicular to the plane of the bite to avoid distortion. A special photographic scale was developed by the American Board of Forensic Odontology (ABFO) for this purpose, as well as for documenting other patterned injuries, and can be obtained from the vendor (ABFO No. 2 reference scale, available from Lightening Powder
Co Inc, Salem, Ore). Names and contact information for ABFO certified odontologists can be obtained from the ABFO website (www.abfo.org).22

In addition to photographic evidence, every bite mark that shows indentations should have a polyvinyl siloxane impression made immediately after swabbing the bite mark for secretions containing DNA. This impression will help provide a 3-dimensional model of the bite mark. Written observations and photographs should be repeated daily for at least 3 days to document the evolution of the bite. Because each person has a characteristic bite pattern, a forensic odontologist may be able to match dental models (casts) of a suspected abuser’s teeth with impressions or photographs of the bite.

Blood group substances can be secreted in saliva. DNA is present in epithelial cells from the mouth and may be deposited in bites. Even if saliva and cells have dried, they should be collected using the double-swab technique. First, a sterile cotton swab moistened with distilled water is used to wipe the area in question, dried, and placed in a specimen tube. A second sterile dry cotton swab cleans the same area, then is dried and placed in a specimen tube. A third control sample should be obtained from an uninvolved area of the child’s skin. All samples should be sent to a certified forensic laboratory for prompt analysis. The chain of custody must be maintained on all samples submitted for forensic analysis. Questions regarding evidentiary procedure should be directed to a law enforcement agency. 5.6. 22-23

Dental neglect

Dental neglect, as defined by the American Academy of Pediatric Dentistry, is the “wilful failure of parent or guardian to seek and follow through with treatment necessary to ensure a level of oral health essential for adequate function and freedom from pain and infection.” Dental caries, periodontal diseases, and other oral conditions, if left untreated, can lead to pain, infection, and loss of function. These undesirable outcomes can adversely affect learning, communication, nutrition, and other activities necessary for normal growth and development.22 Some children who first present for dental care have severe early childhood caries (formerly termed “baby bottle” or “nursing” caries); caregivers with adequate knowledge and wilful failure to seek care must be differentiated from caregivers without knowledge or awareness of their child’s need for dental care in determining the need to report such cases to child protective services. 4.22-23

Failure to seek or obtain proper dental care may result from factors such as family isolation, lack of finances, parental ignorance, or lack of perceived value of oral health.23 The point at which to consider a parent negligent and to begin intervention occurs after the parent has been properly alerted by a health care professional about the nature and extent of the child’s condition, the specific treatment needed, and the mechanism of accessing that treatment. Because many families face challenges in their attempts to access dental care or insurance for their children, the clinician should determine whether dental services are readily available and accessible to the children. 22-23

Possible Symptoms in Children Exposed to Domestic Violence

Sleeplessness, fears of going to sleep, nightmares, dreams of danger;
• Physical symptoms such as headaches or stomachaches;
• Hyper vigilance to danger or being hurt;
• Fighting with others, hurting other children or animals;
• Temper tantrums or defiant behavior;
• Withdrawal from people or typical activities;
• Listlessness, depression, low energy;
• Feelings of loneliness and isolation;
• Current or subsequent substance abuse;
• Suicide attempts or engaging in dangerous behavior;
• Poor school performance;
• Difficulties concentrating and paying attention;
• Fears of being separated from the nonabusing parent;
• Feeling that his or her best is not good enough;
• Taking on adult or parental responsibilities;
• Excessive worrying;
• Bed-wetting or regression to earlier developmental stages;
• Dissociation;
• Identifying with or mirroring behaviors of the abuser. 22-23

CONCLUSION

Children that are victims of physical violence may present intraoral injuries that range from mild injuries, like ecchymoses in the lips to more severe injuries, such as tooth crown fractures. The dentist and the dental staff must be capacitated to diagnose the different types of oral injuries resulting from child abuse, provide the best treatment possible to the victims and notify the authorities responsible for children’s protection of any suspicious or confirmed case of abuse

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22. Injuries to the head and orofacial region. Dental Traumatology 2010 John Wiley & Sons A/S.
CASE REPORT

A RARE CASE OF LARGE PARATUBAL CYST - A DIAGNOSTIC DILEMMA

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ABSTRACT:
Cysts near the ovary are derived from anomalies of the fallopian tubes or the broad ligament. The paramesonephric types consist of ciliated cells similar to the oviduct epithelium. The mesonephric types consist of an epithelium with minimal surface structures. They can be found on the thin oviduct (paratubal cysts) or near its fimbriated end (hydatid of Morgagni). Small paratubal cysts are frequent incidental findings during gynecological surgery and are often confused with ovarian tumors. Most reported cases of paratubal cysts have occurred in pediatric patients, and this type of cyst rarely causes symptoms of lower abdominal pain mimicking appendicitis. However some of them may attain large size and lead to pain, torsion, and rupture and give a diagnostic dilemma. We present a rare case of paratubal cyst of much larger dimensions than usual presentation.

Key words: Paratubal cyst, paraovarian cyst, hydatid of Morgagni

INTRODUCTION
Paratubal cysts represent remnants of the paramesonephric or mesonephric ducts, the former being more common. They are generally known as ‘Hydatid cyst of Morgagni’ and are small, round, blind cysts attached by a pedicle to the fimbriated end of the fallopian tube.¹²

CASE REPORT
A 20 years old female, came to gynecology OPD with history of pain in lower abdomen for 2 months, more since 4-5 days. There was no history of colicky pain, fainting attacks, vomiting or other gastrointestinal disturbances. Her bowel and bladder habits were normal. She was married for 5 months and was nulligravida. Her menstrual cycles were regular, 3-4 days/30 days, moderate flow and were not associated with dysmenorrhea. Her last menstrual period was 15 days back and had a normal flow.

There was history of receiving ATT 11 yrs back for pulmonary koch’s for 1 year. On examination, she was thin built, and her vitals were stable. Per abdominally, there was a soft cystic lump reaching up to umbilicus, dull on percussion, and no fluid thrill. On per vaginum examination uterus was retroverted normal size and bilateral fornices were free. Cyst could not be felt vaginally. Patient’s ultrasound was done on the same day which revealed a large well defined thin walled cystic lesion with echo free contents extending from pelvis to supraumbilical region of 15x12x7 cms, volume 665 cc. Both ovaries were poorly visualized. Diagnosis of Mesenteric cyst? ovarian cyst was made.

Uterus was also normal. Her FNAC was taken; histopathology showed no malignant cells, and findings suggestive of? Dermoid cyst of ovary. With a diagnostic dilemma between a mesenteric cyst and an ovarian cyst, the decision of laparotomy was taken, since malignancy had already been excluded on FNAC.

Abdomen was opened by vertical incision. Uterus and both the ovaries and tubes were normal. A large cyst appx. 15x12x5 cms was seen attached to the left fallopian tube. Left sided fimbrial end was seen separately.
Since cystectomy was not possible, left sided salpingo-oophrectomy along with the cyst removal was done. Care was taken to avoid the rupture of the cyst during surgery. Histopathology of the cyst confirmed the diagnosis of paratubal cyst. Patient’s post operative period was uneventful, and was discharged on 8th day. There was no effect on the fertility of the patient, as she conceived within three months of the surgery.

**DISCUSSION**

Paratubal cysts are frequent incidental findings during gynecological surgeries for other abnormalities, or are found on sonographic examination. Most of these cysts are asymptomatic, and slow growing and are discovered in 3rd and 4th decade of life. Extremes of the sizes have been noted, but most measure less than 3 cms.

The reported incidence of para adnexal cyst [paratubal and paraovarian cysts] varies, but a recent autopsy series cited a rate of 5% of adnexal cysts. No certain risk factors have been found with their formation, although some have reported them to be more common following in-utero exposure to DES [diethyl stilbestrol].

They are generally not detected on pelvic examination. Rarely if they grow large enough symptoms may develop, which mimic those of any other ovarian pathology, such as pelvic or abdominal pain or increasing girth. Such cases are frequently associated with torsion, hemorrhage or rupture. Most cysts have thin smooth walls and anechoic centers. Eccentrically located cysts may resemble hydrosalpinx. Sonography and MR imaging is not helpful in differentiating between ovarian, paraovarian & paratubal cysts. Thus many women may be managed similarly as for the diagnosis of ovarian cyst.

**CONCLUSION**

Paratubal cysts are very difficult to diagnose with sonography, therefore their management should be approached as any other adnexal mass. However rupture or puncture of masses should be avoided when possible, to prevent potential tumour dissemination in the event of a malignancy, as cases of endometrioid tumour of variable malignant potential has been noted arising in paratubal cysts.

**REFERENCE:**

CASE REPORT

A RARE CASE OF COLONIC PERFORATION PRESENTING AS SUBCUTANEOUS EMPYEMEA OF LOWER CHEST, ANTERIOR ABDOMINAL WALL AND SCROTUM

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ABSTRACT
A 30-yr-old man presented with history of not passing motion and flatus for 4 days, painful abdominal distention and vomiting for 1 day with extensive subcutaneous emphysema of lower chest, anterior abdominal wall and scrotal wall. X ray chest PA view revealed no pneumothorax. X ray abdomen demonstrates multiple air shadows on right side of abdomen with dilated small bowel loops with no gas under diaphragm. CECT scan abdomen showed the outline of ascending colon is ill defined with large pockets of air surrounding the ascending colon with extensive pneumoperitoneum. Diagnoses of retroperitoneal colonic perforation were made. Exploratory laparotomy revealed large cecal perforation with retroperitoneal ascending colon perforation. The parietal peritoneum on right lumbar and right iliac fossa was sloughed. Right hemicolecotomy with end ileostomy was done. Despite multiple operations the patient died 20 days after admission due to multiple organ failure. Patient presenting with subcutaneous emphysema of abdomen and scrotum without an obvious thoracic course should be scrutinized for retroperitoneal hollow viscus perforation to achieve successful early management.

Keywords: Colonic perforation; subcutaneous emphysema

INTRODUCTION
We are using “subcutaneous emphysema” for every state in which air or gas is found within the soft tissues. Subcutaneous emphysema of the chest is mostly associated with pneumothorax following major trauma. Intra-abdominal disease is a rare cause of subcutaneous emphysema. This may be the result of an enteric fistula following gastrointestinal tract perforation that dissects along the anatomic planes. Or there may be extension of a retroperitoneal or subperitoneal abscess with gas-forming organisms along the fascial planes. On the other hand, there may be a hematogenous spread of gas-forming organism to the abdominal wall. Few cases of retroperitoneal leakage have been described. Perforation may be manifested in different ways. Acute abdominal symptoms and peritoneal irritation signs are the most common manifestations.[1,2] In rare clinical conditions, when perforation is oriented toward retroperitoneal area, subcutaneous emphysema may occur. This phenomenon has been scarcely reported previously.[2-4]

CASE REPORT
A 30-year-old man admitted with the complaints of pain in abdomen, distention of abdomen, bilious vomiting (10-12 times) all since 1 day and non passage of feces & flatus since 4 days. In the past history he had upper abdominal surgery in 2001 and no history of trauma. He was afebrile, pulse-92/m, BP – 100/60 mm of Hg, no pallor, icterus or lymphadenopathy. In local examination he had right upper paramedian scar mark, abdominal distension, no erythema or color change in skin and no dilated bowel loops or visible peristalsis. Abdomen had mild tenderness present all over with extensive subcutaneous emphysema present over lower chest, anterior abdominal wall and scrotum. There was no rigidity, guarding or rebound tenderness, free fluid was absent and bowel sound was normal.

Chest had bilateral equal air entry with no evidence of pneumothorax. On per rectal examination there were hard feces. Combining all of above we made a clinical expression of Retroperitoneal perforation of hollow viscus or intraabdominal abscess due to gas forming organisms. Laboratory investigations were within normal limits except for TLC which was 3420/cumm. Chest PA view shows no pneumothorax and lung fields were normal. X ray abdomen AP view shows multiple loculated air shadows on right side of abdomen with dilated small bowel loops, no gas under diaphragm and evidence of subcutaneous emphysema. He was put on intravenous fluids and antibiotics and advised CECT abdomen for confirmation of diagnosis. CECT abdomen showed multiple loculated fluid collections in peritoneal cavity with air specks within & extensive pneumoperitoneum and free fluid in pelvis.

Evidence of extensive pneumoperitoneum in CECT abdomen, patient planned for exploratory laparotomy. Intra operative finding reveals cecal perforation with fecal contamination in pelvis. Friable posterior wall of ascending colon with multiple perforations, large collection of air and fecal matter in retroperitoneum. Peritoneum and posterior rectus sheath in right lower abdomen sloughed. Transverse colon was adhered to right upper abdominal scar. No growth palpated in large bowel. We did right hemicolecotomy with end ileostomy. In post-operative course, patient required reexploration for copious discharge from drains. On 2nd
laparotomy, no new source was found, thorough peritoneal lavage was done. Patient expired after 10 days of 2\textsuperscript{nd} exploration due to uncontrolled sepsis.

Fig 1. Extensive subcutaneous emphysema in anterior abdominal wall (arrow)

Fig. 2 Subcutaneous emphysema in scrotum.
Fig 3. CECT abdomen shows subcutaneous emphysema with retroperitoneal perforation and air around right pararenal space.

DISCUSSION

The subcutaneous emphysema, secondary to perforation of the gastro-intestinal tract was first described by Abeille,' in 1853.[5] Stahlgren and Thabit emphasized that subcutaneous emphysema is an important sign of intra-abdominal abscess containing gas-forming bacteria, and recorded six cases of this association[6]. More uncommon is an involvement of the scrotum in such processes. Oetting et al. [7] stated that the accumulation of gas was dependent on three basic factors: (a) perforation of the bowel, (b) an adequate pressure gradient between the lumen of the bowel and the surrounding tissues, and (c) the anatomic site of perforation. They considered infection as an additional gas-forming factor. A ruptured viscus may: (I) give rise to a localized abscess or peritoneal gas and fluid; (2) cause necrosis of adjacent tissue; (3) cause fistula formation which may act as a safety valve mechanism; or (i) give rise to dissection of gas through soft tissue planes. This dissection may be intramural in the bowel, in the immediate subcutaneous tissues, or through the interstitium of muscle. Dissection of gas is frequently accompanied by retroperitoneal perforation. Pneumoscrotum occasionally can be associated with retroperitoneal or intraperitoneal perforation [8]. In fact the presentation of emphysema is determined largely by the anatomical location of the primary perforation. Generally, emphysema of the anterior abdominal wall is associated with perforation of the small intestine, appendix and colon; emphysema of the scrotum, perineum, or thigh is usually associated with tears in the anorectal area or colon.

The diagnosis of retroperitoneal perforation is usually impeded by the lack of signs of peritoneal irritation. The anatomical site of perforation largely determines the route of escape of the gas to the subcutaneous position. Therefore, the current case, with spontaneous lower chest, whole abdomen and scrotum emphysema resulting from the perforation of the retroperitoneal part of ascending colon is quite original. Patient presenting with subcutaneous emphysema of abdomen and scrotum without an obvious thoracic course should be scrutinized for retroperitoneal hollow viscus perforation to achieve successful early management.

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CONGENITAL CERVICO-VAGINAL ATRESIA – A CASE REPORT

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ABSTRACT
Congenital cervico-vaginal atresia with a functional uterus, resulting in retrograde menstruation, leading to haematometra and in late cases haematosalpinx and pelvic endometriosis is a rare anomaly of the Mullerian system. The main aim of management in a young patient with no severe haematometra, minimal pelvic endometriosis and adhesions is uterovaginal anastomosis/canalization to restore normal menstruation and fertility through assisted reproductive techniques. But in patients, whose chances of fertility would be markedly compromised by the presence of pelvic endometriosis, adhesions, haematometra, ovarian endometriotic cysts or advanced age, primary hysterectomy rather than conservative management should be considered.

Key words: Congenital Cervical Atresia, Haematometra

INTRODUCTION
Congenital cervical atresia with or without vaginal agenesis, but with functional uterus is a rare anomaly of the Mullerian system (1,2). The presence of functional endometrium and functional ovaries may cause retrograde menstruation, leading to haematometra and in late cases haematosalpinx and pelvic endometriosis. The most common clinical presentation occurs after menarche in the form of primary amenorrhoea, cyclic abdominal pain and abdominopelvic masses. Early diagnosis and reconstructive surgery is necessary to relieve the symptom related to haematometra and retrograde menstruation and to restore regular menstruation and fertility (1, 2). Many reconstruction procedures have been performed to relieve the symptoms, but eventually hysterectomy may be required in some complicated cases.

CASE REPORT
In January 2006, a 24 year old, unmarried female of low socioeconomic status presented to the gynaec OPD of our hospital with complaints of primary amenorrhoea and cyclic lower abdominal pain for 10 years. Since 2-3 years she also felt a lump in lower abdomen. Tracing back her past history, there was a normal onset of thelarche and pubarche at 12 years of age. She had sought care at various medical centers over the past 8-10 years. A pelvic sonography was done at 14 yrs of age which showed a bulky uterus with haematometra and normal adnexae. She received symptomatic medical treatment by many doctors (analgesics, antibiotics and long courses of oral contraceptives). A repeat sonography at 18 yrs of age revealed an enlarged uterus (97mm x 66mm x 60 mm) with haematometra with right sided ovarian cyst (85mm x 76mm x 66 mm). She was advised surgical treatment by various doctors, but did not get any surgery done due to financial constraints.

Physical examination revealed a healthy looking girl, 164 cm tall and weighing 42 kg. The pubic and axillary hair was normal. Secondary sex characters were well developed. Her vital signs were normal. Abdominal examination revealed enlarged uterus (14 weeks pregnant uterus size) and a lump in left iliac fossa (4 x 6 cm), which was non-mobile, mildly tender. Pelvic examination revealed normal-appearing external genitalia but only a small shallow dimple at the vaginal introital site (2-3 cm). There was no evidence of a bulge or haematometra. On per rectal examination, a firm pelvic mass was felt 2-3 cm above the anal orifice through the anterior wall of rectum. Pelvic sonography showed a large fluid-filled uterus (16 cm in longitudinal diameter), consistent with a haematometra. No obvious uterine cervix was seen. Fibrous tissue was seen in upper part of vagina. There was a mass in right adnexa (8x6cm) that appeared to be contiguous with the uterus (haematosalpinx or tuboovarian mass). Left ovary was seen normally. No anomaly in urinary system or any other system was seen. Her haemogram, liver and renal function tests were normal. Serum concentrations of LH, FSH, oestradiol, prolactin and TSH were all within normal limits. Therefore, a provisional diagnosis of cervical and vaginal atresia associated with haematometra and right tubo-ovarian mass was made and laparotomy decided.

At laparotomy, dense adhesions were found between omentum, small and large intestines, uterus, bilateral tubes and ovaries forming frozen pelvis. All adhesions were separated carefully. Uterus was 14-16 weeks size with haematometra with right sided haematosalpinx with endometriotic cysts in right ovary. Left ovary was normal. Hysterectomy with right salpingo-oophorectomy was done. The post –
operative period was un-eventful. Gross pathological examination of the specimen showed uterus with blind cervix. On cut section, uterine cavity was filled with old clotted blood, cervix was solid, cervical os and cervical canal could not be visualized. Cut section of tubo ovarian mass showed cystic and hemorrhagic areas in the ovary and tube.

Microscopic Examination revealed functional endometrium of non-secretory type. Sections from cervical area revealed no epithelium, no cervical stroma and no cervical glands. The normal ovarian tissue was almost replaced by haemorrhage and cystic areas with occasional primordial follicle.

Fig. 1- Gross photograph of the uterus with cervical agenesis.

DISCUSSION

Congenital atresia of the uterine cervix with absence of cervical stroma and endocervical glands, is a very uncommon class 1B mullerian malformation associated in 50% of the cases with a vaginal aplasia (3,4). Any abdominal or pelvic, acute or chronic pain, in a pubescent girl must evoke suspicion of an obstructive genital syndrome. Transabdominal or transperineal sonography may specify the level of the obstacle, but are not very reliable for the diagnosis of uterine cervical atresia. MRI appears to be the most reliable diagnostic tool for uterovaginal malformations (3, 4).

Unlike most other mullerian anomalies, the initial surgical management of congenital cervical atresia remains controversial. The main aim of management is uterovaginal anastomosis / canalization to restore normal menstruation and fertility. Because of post-operative complications of uterovaginal canalization including intraabdominal infection, recurrent obstruction of uterovaginal neocanal due to canal stricture or stenosis and persistent infertility, a majority of clinicians view hysterectomy as the optimal primary surgical management in these patients (3, 4). Lack of endocervical glandular function and epithelium may be one of the most important contributing factors resulting in stenosis and infertility (1, 2, 3).

The majority of these patients have evidence of either pelvic endometriosis or pelvic adhesive disease or both at the time of laparoscopy/laparotomy. The degree of pelvic endometriosis and adhesions present needs to be considered in recommending a surgical approach to the problem. It must be emphasized that patients, whose chances of fertility would be markedly compromised by the presence of pelvic endometriosis, pelvic adhesions, salpingitis, ovarian endometriotic cysts or advanced maternal age should be advised to consider primary hysterectomy rather than conservative management (3).

This case was unique in its late presentation with haematometra, haematosalpinx, endometriotic ovarian cysts and dense pelvic adhesions and chances of fertility appeared almost nil. Hence, hysterectomy and right sided salpingoo-oopherectomy was decided as the primary treatment to relieve her from her symptoms. Absence of cervical stroma and glands was substantiated by pathological examination.

The ideal candidate for canalization would be the patient of young age with no severe haematometra, minimal pelvic endometriosis and adhesions at the time of surgery. Amniotic membrane appears to be a good alternative endogenous material for epithelisation of neocervix in uterovaginal canalization procedures (2). It has been suggested that successful reconstruction is likely only in the presence of cervical stroma. Further, recent advancements in assisted reproductive techniques may afford patients, who successfully undergo canalization procedure, a better opportunity to achieve pregnancy in the future (1, 2, 3, 4).
REFERENCES:
Instructions to the Authors

(A) Preparing a manuscript for submission to Santosh University Journal of Health Sciences

Unpublished original manuscript written in English should be sent to: Dr. B. R. Sharma Founder Chief Editor Santosh University Journal of Health Sciences by email attachment at dean.research@santosh.ac.in

1. General Principles
The text of observational and experimental articles is usually (but not necessarily) divided into the following sections: Introduction, Methods, Results, and Discussion. This so-called “IMRAD” structure is not an arbitrary publication format but rather a direct reflection of the process of scientific discovery. Long articles may need subheadings within some sections (especially Results and Discussion) to clarify their content. Other types of articles, such as case reports, reviews, and editorials, probably need to be formatted differently. Electronic formats have created opportunities for adding details or whole sections, layering information, crosslinking or extracting portions of articles, and the like only in the electronic version. Double spacing all portions of the manuscript—including the title page, abstract, text, acknowledgments, references, individual tables, and legends—and generous margins make it possible for editors and reviewers to edit the text line by line and add comments and queries directly on the paper copy. If manuscripts are submitted electronically, the files should be double-spaced to facilitate printing for reviewing and editing. Font should be Arial and font size 11. Authors should number all of the pages of the manuscript consecutively, beginning with the title page, to facilitate the editorial process.

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The title page should have the following information:
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3. The name of the department(s) and institution(s) to which the work should be attributed.
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The name, postal address, telephone and fax numbers, and e-mail address of the author responsible for correspondence about the manuscript (the “corresponding author;” this author may or may not be the “guarantor” for the integrity of the study). The corresponding author should indicate clearly whether his or her e-mail address can be published.
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To prevent the information on potential conflicts of interest from being overlooked or misplaced, it needs to be part of the manuscript. However, it should also be included on a separate page or pages immediately following the title page. Individual journals may differ in where they include this information, and some journals do not send information on conflicts of interest to reviewers.

4. Abstract
The abstract (requirements for length and format vary) should follow the title page. It should provide the context or background for the study and should state the study’s purpose, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), and principal conclusions. It should emphasize new and important aspects of the study or observations. Articles on clinical trials should contain
abstracts that include the items that the CONSORT group has identified as essential (www.consort-statement.org/?_1190). Because abstracts are the only substantive portion of the article indexed in many electronic databases, and the only portion many readers read, authors need to be careful that they accurately reflect the content of the article. Unfortunately, the information contained in many abstracts differs from that in the text (6). The format required for structured abstracts differs from journal to journal, and some journals use more than one format; authors need to prepare their abstracts in the format specified by the journal they have chosen. The ICMJE recommends that journals publish the trial registration number at the end of the abstract. The ICMJE also recommends that, whenever a registration number is available, authors list that number the first time they use a trial acronym to refer to either the trial they are reporting or to other trials that they mention in the manuscript.

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Provide a context or background for the study (that is, the nature of the problem and its significance). State the specific purpose or research objective of, or hypothesis tested by, the study or observation; the research objective is often more sharply focused when stated as a question. Both the main and secondary objectives should be clear, and any prespecified subgroup analyses should be described. Provide only directly pertinent references, and do not include data or conclusions from the work being reported.

6. Methods
The Methods section should include only information that was available at the time the plan or protocol for the study was being written; all information obtained during the study belongs in the Results section.

6. a. Selection and Description of Participants
Describe your selection of the observational or experimental participants (patients or laboratory animals, including controls) clearly, including eligibility and exclusion criteria and a description of the source population. Because the relevance of such variables as age and sex to the object of research is not always clear, authors should explain their use when they are included in a study report—for example, authors should explain why only participants of certain ages were included or why women were excluded. The guiding principle should be clarity about how and why a study was done in a particular way. When authors use such variables as race or ethnicity, they should define how they measured these variables and justify their relevance.

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Identify the methods, apparatus (give the manufacturer’s name and address in parentheses), and procedures in sufficient detail to allow others to reproduce the results. Give references to established methods, including statistical methods (see below); provide references and brief descriptions for methods that have been published but are not well-known; describe new or substantially modified methods, give the reasons for using them, and evaluate their limitations. Identify precisely all drugs and chemicals used, including generic name(s), dose(s), and route(s) of administration. Authors submitting review manuscripts should include a section describing the methods used for locating, selecting, extracting, and synthesizing data. These methods should also be summarized in the abstract.

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Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as P values, which fail to convey important information about effect size. References for the design of the study and statistical methods should be to standard works when possible (with pages stated). Define statistical terms, abbreviations, and most symbols. Specify the computer software used.

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8. Discussion
Emphasize the new and important aspects of the study and the conclusions that follow from them. Do not repeat in detail data or other information given in the Introduction or the Results section. For experimental studies, it is useful to begin the discussion by summarizing briefly the main findings, then explore possible mechanisms or explanations for these findings, compare and contrast the results with other relevant studies, state the limitations of the study, and explore the implications of the findings for future research and for clinical practice. Link the conclusions with the goals of the study but avoid unqualified statements and conclusions not adequately supported by the data. In particular, avoid making statements on economic benefits and costs unless the manuscript includes the appropriate economic data and analyses. Avoid claiming priority or alluding to work that has not been completed. State new hypotheses when warranted, but label them clearly as such.

9. References
9. a. General Considerations Related to References
Although references to review articles can be an efficient way to guide readers to a body of literature, review articles do not always reflect original work accurately. Readers should therefore be provided with direct references to original research sources whenever possible. On the other hand, extensive lists of references to original work on a topic can use excessive space on the printed page. Small numbers of references to key original papers often serve as well as more exhaustive lists, particularly since references can now be added to the electronic version of published papers, and since electronic literature searching allows readers to retrieve published literature efficiently. Avoid using abstracts as references. References to papers accepted but not yet published should be designated as “in press” or “forthcoming”; authors should obtain written permission to cite such papers as well as verification that they have been accepted for publication. Information from manuscripts submitted but not accepted should be cited in the text as “unpublished observations” with written permission from the source. Avoid citing a “personal communication” unless it provides essential information not available from a public source, in which case the name of the person and date of communication should be cited in parentheses in the text. For scientific articles, obtain written permission and confirmation of accuracy from the source of a personal communication.

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9. b. Reference Style and Format
The Uniform Requirements style for references is based largely on an American National Standards Institute style adapted by the NLM for its databases. Authors should consult NLM’s Citing Medicine for information on its recommended formats for a variety of reference types.

References should be numbered consecutively in the order in which they are first mentioned in the text. Identify references in text, tables, and legends by Arabic numerals in parentheses. References cited only in tables or figure Legends should be numbered in accordance with the sequence established by the first identification in the text of the particular table or figure. The titles of journals should be abbreviated according to the style used in the list of Journals Indexed for MEDLINE, posted by the NLM on the Library’s Web site. Journals vary on whether they ask authors to cite electronic references within parentheses in the text or in numbered references following the text. Authors should consult with the journal to which they plan to submit their work. Examples are:

10. Tables
Tables capture information concisely and display it efficiently; they also provide information at any desired level of detail and precision. Including data in tables rather than text frequently makes it possible to
reduce the length of the text. Type or print each table with double spacing on a separate sheet of paper. Number tables consecutively in the order of their first citation in the text and supply a brief title for each. Do not use internal horizontal or vertical lines. Give each column a short or an abbreviated heading. Authors should place explanatory matter in footnotes, not in the heading. Explain all nonstandard abbreviations in footnotes, and use the following symbols, in sequence:

*, †, ‡, §, ‖, **, ††, ‡‡

Identify statistical measures of variations, such as standard deviation and standard error of the mean. Be sure that each table is cited in the text.

If you use data from another published or unpublished source, obtain permission and acknowledge that source fully. Additional tables containing backup data too extensive to publish in print may be appropriate for publication in the electronic version of the journal, deposited with an archival service, or made available to readers directly by the authors. An appropriate statement should be added to the text to inform readers that this additional information is available and where it is located. Submit such tables for consideration with the paper so that they will be available to the peer reviewers.

11. Illustrations (Figures)

Figures should be either professionally drawn and photographed, or submitted as photographic-quality digital prints. In addition to requiring a version of the figures suitable for printing, some journals now ask authors for electronic files of figures in a format (for example, JPEG or GIF) that will produce high-quality images in the Web version of the journal; authors should review the images of such files on a computer screen before submitting them to be sure they meet their own quality standards. For x-ray films, scans, and other diagnostic images, as well as pictures of pathology specimens or photomicrographs, send sharp, glossy, black-and-white or color photographic prints, usually 127 x 173 mm (5 x 7 inches). Although some journals redraw figures, many do not. Letters, numbers, and symbols on figures should therefore be clear and consistent throughout, and large enough to remain legible when the figure is reduced for publication. Figures should be made as self-explanatory as possible, since many will be used directly in slide presentations. Titles and detailed explanations belong in the legends—not on the illustrations themselves. Photomicrographs should have internal scale markers. Symbols, arrows, or letters used in photomicrographs should contrast with the background. Photographs of potentially identifiable people must be accompanied by written permission to use the photograph.

Figures should be numbered consecutively according to the order in which they have been cited in the text. If a figure has been published previously, acknowledge the original source and submit written permission from the copyright holder to reproduce the figure. Permission is required irrespective of authorship or publisher except for documents in the public domain.

For illustrations in color, ascertain whether the journal requires color negatives, positive transparencies, or color prints. Accompanying drawings marked to indicate the region to be reproduced might be useful to the editor.

12. Legends for Illustrations (Figures)

Type or print out legends for illustrations using double spacing, starting on a separate page, with Arabic numerals corresponding to the illustrations. When symbols, arrows, numbers, or letters are used to identify parts of the illustrations, identify and explain each one clearly in the legend. Explain the internal scale and identify the method of staining in photomicrographs.

13. Units of Measurement

Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or litre) or their decimal multiples. Temperatures should be in degrees Celsius. Blood pressures should be in millimetres of mercury, unless other units are specifically required by the journal. Journals vary in the units they use for reporting hematologic, clinical chemistry, and other measurements. Authors must consult the Information for Authors of the particular journal and should report laboratory information in both local and International System of Units (SI). Editors may request that authors add alternative or non-SI units, since SI units are not universally used. Drug concentrations may be reported in either SI or mass units, but the alternative should be provided in parentheses where appropriate.

14. Abbreviations and Symbols

Use only standard abbreviations; use of nonstandard abbreviations can be confusing to readers. Avoid abbreviations in the title of the manuscript. The spelled-out abbreviation followed by the abbreviation in parenthesis should be used on first mention unless the abbreviation is a standard unit of measurement.

B. Sending the Manuscript to the Journal

Santosh University Journal of Health Sciences accepts electronic submission of manuscripts, whether on disk, as an e-mail attachment, or by downloading directly onto the journal’s Web site. Electronic submission saves time and money and allows the manuscript to be handled in electronic
form throughout the editorial process (for example, when it is sent out for review). For specific instructions on electronic submission, authors should consult the journals Instructions for Authors. If a paper version of the manuscript is submitted, send the required number of copies of the manuscript and figures; they are all needed for peer review and editing, and the editorial office staff cannot be expected to make the required copies. Manuscripts must be accompanied by a cover letter, which should include the following information.

a) A full statement to the editor about all submissions and previous reports that might be regarded as redundant publication of the same or very similar work should be referred to specifically and referenced in the new paper. Copies of such material should be included with the submitted paper to help the editor address the situation.

b) A statement of financial or other relationships that might lead to a conflict of interest, if that information is not included in the manuscript itself or in an authors’ form.

c) A statement that the manuscript has been read and approved by all the authors, that the requirements for authorship as stated earlier in this document have been met, and that each author believes that the manuscript represents honest work if that information is not provided in another form (see below).

d) The name, address, and telephone number of the corresponding author, who is responsible for communicating with the other authors about revisions and final approval of the proofs, if that information is not included in the manuscript itself. The letter should give any additional information that may be helpful to the editor, such as the type or format of article in the particular journal that the manuscript represents.

e) If the manuscript has been submitted previously to another journal, it is helpful to include the previous editor’s and reviewers’ comments with the submitted manuscript, along with the authors’ responses to those comments. Editors encourage authors to submit these previous communications. Doing so may expedite the review process.

Many journals now provide a pre-submission checklist to help the author ensure that all the components of the submission have been included. Some journals now also require that authors complete checklists for reports of certain study types (for example, the CONSORT checklist for reports of randomized, controlled trials). Authors should look to see if the journal uses such checklists, and send them with the manuscript if they are requested. Letters of permission to reproduce previously published material, use previously published illustrations, report information about identifiable persons, or to acknowledge people for their contributions must accompany the manuscript.