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## National Girl Child Day: Guest Comment

RHYTHM KAUR 

*It is said that girls with dreams become women with vision. May we empower each other to carry out such vision*

*-Meghan Markle*

Keeping in line with this thought every year since its initiation in 2008, January 24<sup>th</sup> is celebrated as “National Girl Child Day”. It works side by side other schemes for development of the girl child like “Save the Girl Child”, “Beti Bachao Beti Padhao”, “Sukanya Samridhi Account”, “CBSE Udaan Scheme” and many more promoting awareness of issues facing girl child in India, such as education, nutrition, child marriage, legal rights and medical care, protection, honour. India is celebrating its 15<sup>th</sup> anniversary of National Girl Child Day or Rashtriya Balika Diwas. It commemorates every year with diverse themes aimed at empowering the girl child in diverse walks of life. Adolescent girls have the right to a safe, educated, and healthy life, not only during these critical formative years, but also as they mature into women.

If effectively supported during the adolescent years, girls have the potential to change the world -both as the empowered girls of today and as tomorrow's worker, mothers, entrepreneurs, mentors, household heads, and political leaders. An investment in realizing the power of adolescent girls upholds their rights today and promises a more equitable and prosperous future, one in which half of humanity is an equal partner in solving the problems of climate change, political conflict, economic growth, disease prevention, and global sustainability. Girls are breaking boundaries and barriers posed by stereotypes and exclusion, including

those directed at children with disabilities and those living in marginalized communities. As innovators and initiators of global movements, girls are creating a world that is relevant for them and future generations. It is crystal clear that empowering a girl child is the need of the hour or present day scenario. Education of girl child has been a high priority with the government of India, according to the Right To Education act, every child of the age of 6 -14 years shall have a right to free and compulsory education in a neighbourhood school till completion of elementary education. For the success of Sarva Shiksha Abhayan or education for all, the education of girl child is a must.

No doubt, girls deserve a better deal from society at present, they say girls are no way inferior to boys but what are they getting from society? A whole range of discriminatory practices including female foeticide, female infanticide, early marriage, and dowry which have buried the future of girl child. It seems very difficult to empower the girl child. Our society is still suffering many weaknesses. Instead of giving them education, they are being subjected to sufferings and this has become part and parcel of society. Girls need more role models to aspire to the likes of women such as Dhivyaa Suryadevara in automobile industry, Hima Das in athletics, Arunima Sinha is a special abilities mountain climber. We also need to motivate underprivileged and unmotivated parents to avail education operative made available by the government for their children. To curb the menaces and to recognize girls and unique challenges girls face around the world, we must all stand together.



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# Curcumin: A Review of Its' Effects on Human Health

SANJANA SETH<sup>1</sup>, KASHMEERA AGARWAL<sup>2</sup>, ABDUL RAHMAN<sup>3</sup>

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Turmeric, commonly referred to as “Indian saffron” or the “golden spice”, is a rhizomatous herbaceous perennial plant (*Curcuma longa*) and belongs to the ginger family. Spices made from the ground roots of the plant are available commercially. It has been used an active ingredient for formulating various medicinal preparations, and finds regular use in Ayurveda and Chinese medicine. Turmeric, and its constituent ingredients are being considered as multitargeted phytochemicals in the treatment of cancer as cell functions like apoptosis, autophagy, and cell cycle arrest are affected by its use. It has been shown to improve systemic markers of oxidative stress and its effect on free radicals is carried out by several different mechanisms. This brief review discusses the health benefits of curcumin as well as its medicinal use

**KEYWORDS:** Curcumin, Cancer, Arthritis, Antioxidant

## INTRODUCTION

Turmeric, commonly referred to as “Indian saffron” or the “golden spice”, is a tall plant commonly found growing in Asia and Central America. It is a rhizomatous herbaceous perennial plant (*Curcuma longa*) and belongs to the ginger family.<sup>1</sup> Spices made from the ground roots of the plant are available commercially. Due to its bright yellow color(processed turmeric), it has inspired many cultures to use it as a dye. This spice has received great interest from both the medical/scientific worlds as well as from the culinary world.<sup>2</sup>

It is curcumin, a yellow polyphenolic pigment from the *Curcuma longa* L. (turmeric) rhizome, that has been used an active ingredient for formulating various medicinal preparations, and finds regular use in Ayurveda and Chinese medicine. Interestingly, this natural polyphenol is universally known as the “wonder drug of life”.<sup>3</sup> In India, turmeric, which containing curcumin, finds its regular use and consumption in curries, whereas in Japan, it is usually served in tea. It finds its use in the cosmetics industry in Thailand, while in China, it is used actively used as a colorant and in Korea, served in drinks. Malaysians use it as an antiseptic while in the United States, it is used in various preparations including mustard sauce, butter, cheese and chips. Curcumin is available in several forms including capsules, tablets, ointments, energy drinks, soaps, and cosmetics and is used in daily activities, albeit in many forms.<sup>3</sup>

In the far east, since ancient times, turmeric has been widely used for treating inflammations of various organs, for problems arising from the liver and digestive tract as well as to treat wound healing. During the 1970s, the first research on curcumin's health benefits was documented in the scientific literature. This particular study and studies conducted later reported the fact that curcumin has multiple therapeutic benefits and immense potential medicinal use. However, turmeric was still not commercially available and readily used as a therapeutic agent,<sup>4</sup> due to its low bioavailability. It was reported that due to the hydrophobic nature of curcumin after oral administration, it triggers a poor absorption rate via the gastrointestinal (GI) tract. While on the other hand, curcumin offers a favourable and encouraging potential as it is categorized as a Generally Recognized As Safe (GRAS) material having a stable metabolism and low toxicity among humans.<sup>5</sup>

When used as a tonic for dyslipidaemia, stomach disorders, arthritis, hepatic diseases as well a wide variety of other diseases, it was found to provide immense benefits to the patients.<sup>6</sup> Due to the immense benefits of curcumin listed above, this brief review discusses the health benefits of curcumin in daily as well as medicinal use.

## ANTICANCER PERSPECTIVES

Turmeric, and its constituent ingredients are being



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considered as multitargeted phytochemicals in the treatment of cancer as cell functions like apoptosis, autophagy, and cell cycle arrest are affected by its use.<sup>7</sup> Various authors have documented that various signalling pathways (e.g., p53, Ras, phosphoinositide 3-kinase, AKT, Wnt/ $\beta$ -catenin, and mammalian target of rapamycin) as the anticancer targets of curcumin.<sup>8</sup>

**Colorectal Cancer (CRC):** Curcumin can serve as an expedient remedy in the prevention of CRC among obese individuals by stimulating AMP-activated kinase by reducing the appearance of COX-2 protein and subsequently repressing the action of nuclear factor- $\kappa$ B (NF- $\kappa$ B) on mucosal colon. It also diminishes leptin concentration in the serum and subsequently increases the adiponectin level.<sup>9</sup>

**Renal Cancer:** Long exposure of the cell lining of the human kidneys to 10  $\mu$ M curcumin have resulted in changes in the swelling-activated chloride current in a dose-dependent manner. Its application induces apoptosis in the human kidney cells by stimulating the emergence of a subpopulation of the cells with amplified volume at a concentration of 5.0–10  $\mu$ M. Furthermore, 50  $\mu$ M curcumin has seen to initiate apoptosis and enlarge the size of colorectal adenocarcinoma cells; this cell cycle arrest is attributed to the fact which increases the size of the cell line after post-exposure to curcumin.<sup>10</sup>

**Hepatic Cancer:** Curcumin has been reported to target the spindle assembly checkpoint which leads to initiation of apoptosis in cells having a higher concentration of phosphorylated cell division cycle 27 (CDC27). This phosphorylation of CDC27 is the mechanism by which curcumin exerts its much beneficial anticancer effect.<sup>11</sup>

**Bone Cancer:** Curcumin has time and again proven its strong antiproliferative and anti-inflammatory properties, which is limited by its low water solubility. As per the results of a controlled study, the preparation and characterization of nanocurcumin using poly-lactic-co-glycolic acid significantly improved the water solubility and antitumor activity of curcumin.<sup>12,13</sup>

**Blood and Other Cancers:** The initiation of G<sub>2</sub>/M phase arrest by curcumin was the main reason for an evident reduction in the cyclin A, cyclin B, and cyclin-dependent kinase 1 protein expression. The apoptosis induction by curcumin is escorted with an upregulation of the Bax protein expression as well as

the downregulation of the Bcl-2 protein quantity resulting in mitochondria dysfunction, consequently leading to cytochrome c release and sequential activation of caspase-9 and caspase-3 in the nasopharyngeal carcinoma-TW 076 cells. As a result of this mechanism, mitochondria and apoptosis-inducing factor caspase-3-dependent pathways are the fundamental figures in G<sub>2</sub>/M phase arrest and cell apoptosis by curcumin.<sup>14,15</sup>

## ANTIOXIDANT AND ANTI-INFLAMMATORY PROPERTIES

Curcumin has been shown to improve systemic markers of oxidative stress and its effect on free radicals is carried out by several different mechanisms.<sup>15</sup> It acts by scavenging different forms of free radicals, such as reactive oxygen and nitrogen species (ROS and RNS, respectively).<sup>16</sup> In addition, curcumin is a lipophilic compound, which makes it an efficient scavenger of peroxy radicals, therefore, like vitamin E, curcumin is also considered as a chain-breaking antioxidant.<sup>17</sup> Curcumin has also been shown to suppress inflammation through many different mechanisms, thereby supporting its mechanism of action as a potential anti-inflammatory agent.<sup>18</sup>

## ARTHRITIS

Once considered primarily a degenerative and non-inflammatory condition with no cure, a few pharmaceutical therapies are available for treatment of osteoarthritis, many of which are costly and have undesirable side effects. Hence, patients tend to be inclined towards alternative treatments which include the intake of dietary supplements and herbal remedies.<sup>19</sup> Several studies have shown the anti-arthritic effects of curcumin in humans with Osteoarthritis (OA) and rheumatoid arthritis (RA).<sup>2,20</sup> Irrespective of the mechanism by which curcumin demonstrates its effects, it appears to be beneficial by healing several aspects of OA. Scientific evidence has reports that use of 8–12 weeks of standardized turmeric extracts (1000 mg/day) is beneficial in reducing arthritis symptoms (mainly pain and inflammation-related symptoms) and result in similar improvements in the symptoms as seen with common anti-analgesics like ibuprofen and diclofenac sodium.<sup>21</sup>

## METABOLIC SYNDROME

Curcumin has been shown to attenuate several aspects of Metabolic Syndrome by improving insulin sensitivity<sup>22</sup>, suppressing adipogenesis<sup>2</sup>, decreasing blood pressure, inflammation and oxidative stress.<sup>22</sup>



## SIDE EFFECTS

The natural, trustworthy curcumin has a long-established safety record with the Allowable Daily Intake (ADI) as 0–3 mg/kg body weight [as per JECFA (The Joint United Nations and World Health Organization Expert Committee on Food Additives) and EFSA (European Food Safety Authority)].<sup>24</sup> However, despite its impressive benefits, a few side effects have been reported among subjects receiving doses of 500–12,000 mg of curcumin and followed for 72 hours experienced diarrhea, headache, rash, and yellow stool as side effects.<sup>25</sup> In the findings of Sharma RA et al., subjects receiving 0.45 to 3.6 g/day of curcumin between one to four months documented nausea and diarrhea with an increase in serum alkaline phosphatase and lactate dehydrogenase levels.<sup>26</sup>

## CONCLUSIONS

Curcumin, which has been used since ancient times for its health benefits, has stood the test of time and is regularly used in treatment of various diseases, especially where herbal medicines are practiced. Following proper protocols, and proper patient selection, its use can be further encouraged as an alternative to allopathic medicines as it is cheaper and equally effective.

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# The Toxicity of Corticosteroids

DAVID SMITH<sup>1</sup>, VENU SEN<sup>2</sup>

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Minimization of steroid therapy has always been one of the main objectives of immunosuppressive protocols after kidney transplantation, due to numerous side effects. The use of a further reduced daily dose of steroids is considered by many to be a fair compromise between toxicity and efficacy. Unfortunately, the great inter-individual variability of the pharmacokinetics of steroids does not prevent the appearance of major side effects in a variable percentage of patients, even with the low dose used. A drug interaction between steroids and drugs used after transplantation can also contribute to increasing daily exposure to the drug. Steroid discontinuation is still the only procedure capable of achieving the desired goal. This procedure is associated with a greater risk of acute rejection, without however reducing the survival of the transplant. It should be offered to patients at low immunological risk. Early discontinuation, during the first week of transplantation, is also the modality suggested by some guidelines, although a later suspension also offers excellent results. Induction therapy is always recommended in the case of early discontinuation.

**KEYWORDS:** Corticosteroids, Steroids, Drug Toxicity

## INTRODUCTION

Synthetic glucocorticoids were introduced in the late 1950s and are the drugs used for the longest time after kidney transplantation. At first, prednisone, or its equivalent, was administered once or twice a day, at a dose of 15 mg.<sup>1</sup> The first studies immediately documented two important aspects related to their clinical use: The first was that steroids were effective in preventing acute rejection only when used in combination with other drugs, and not when used alone. The second one concerned the appearance of serious side effects when used for a longer period of time. The latter problem was so important that it became the subject of many studies, and soon new therapeutic schemes were proposed with the aim of containing this problem that reduced the quality of life of patients.<sup>2</sup> It was reported in a study that there is no consensus on what the minimum required dose of steroid should be, the minimum dose required may differ from subject to subject and gradual steroid reduction leads to an increased risk of acute rejection.<sup>3</sup>

The appearance of cyclosporine gave rise to a new line of clinical research based on the possibility of implementing immunosuppressive protocols without steroids.<sup>4</sup> This was immediately received with great interest by clinicians because it allowed to eliminate, or reduce, the known side effects related to the prolonged use of the steroid.<sup>5</sup> There is no doubt that steroid-free protocols increase the risk of acute

rejection.<sup>6</sup> Unfortunately, they do not even reduce patient mortality, as expected, given the significant reduction of some of the main risk factors for cardiovascular disease, always reported in these cases.<sup>7</sup> On the basis of this evidence, steroid-free protocols today must have, as the only main objective of avoiding the known side effects, in order to improve the patient's quality of life. At this point, the problem arises of what is the real incidence and severity of these side effects today. Today, compared to past decades, the daily dosage of prednisone or its equivalent has gradually decreased. Therefore, it is questionable whether such a low dose is in any case toxic for the patient or is free from important side effects.

A study showed that 5 mg of steroid per day, compared to discontinuation, did not increase the risk of diabetes mellitus.<sup>8</sup> This conclusion confirmed a previous study that evaluated the effect of different doses of steroid on peripheral insulin resistance, also in renal transplant patients. The study showed that insulin sensitivity improved with the gradual reduction of doses.<sup>9</sup> However, these results were contradicted by another study, published in 2016.<sup>10</sup> Even low doses of steroid can affect the onset of diabetes, especially if taken for a long period of time, and if taken in combination with other pro-diabetic drugs.<sup>11</sup> Another side effect that could benefit from the discontinuation of the steroid concerns bone



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pathology, in particular osteoporosis. As is known, this pathology carries a high risk of spontaneous vertebral or peripheral fractures, with serious repercussions on the patient's quality of life. It is agreed that the greatest loss of bone density occurs during the first 6-12 months of transplantation, a period in which steroid doses are usually higher.<sup>12</sup> It has been calculated that avoiding the steroid can significantly reduce the risk of osteoporosis, but not eliminate it completely, given the pathogenetic role played by other factors.<sup>13</sup> In one study, it was documented that a daily dose between 2.5-7.5 mg corresponded to an increased risk of 18% for peripheral fractures, and 54% for vertebral fractures.<sup>14</sup>

Thus, using low doses of the steroid reduces the risk of osteoporosis, but it cannot be argued that it is equivalent to not using it at all. On the contrary, the increase in risk remains significant even at low doses and will probably be even greater in the categories of more exposed subjects. Another finding that emerged from this study is that the risk of steroid-induced fractures does not increase during the course of therapy, and rapidly decreases after its discontinuation.<sup>15</sup> Another aspect to focus on is offered to us by daily clinical practice. It is common experience that the same steroid dose, even if low, can have very different side effects from patient to patient. This evidence should suggest the need to tailor the steroid dose.

In the field of transplantation, the two most commonly used synthetic glucocorticoids are prednisone and prednisolone. The latter is the main corticosteroid present in plasma and is the only one capable of crossing the cell membrane and producing the expected pharmacological effects. Prednisone and prednisolone both have rapid intestinal absorption both have a high bioavailability. After transplantation, the elimination of prednisolone is slowed down by the concomitant use of several drugs. The elimination of the drug is not constant, it decreases after the first year.<sup>16</sup> These pharmacokinetic notes document the complexity of steroid metabolism which corresponds to a wide inter-individual variability, and consequently a different toxicity from subject to subject. Many studies, especially in the past, have evaluated whether there was a correlation between the degree of exposure to prednisolone and the occurrence of one or more side effects. In this context, one of the most investigated complications was Cushing's Syndrome. It has been hypothesized that the appearance of these manifestations could depend on greater exposure to the drug, despite equally low daily doses. In some

patients, smaller doses are sufficient to obtain the desired pharmacological effect. In fact, some pharmacokinetic studies have confirmed a correlation between high exposure to prednisolone, and the appearance of Cushing-like side effects.<sup>17</sup> These findings, of certain clinical relevance, were confirmed<sup>18-20</sup>, but also denied by some studies<sup>21-23</sup>, and therefore the problem remains open to different interpretations. Greater steroid exposure was also reported in subjects who developed diabetes after transplantation.<sup>24</sup> Pharmacodynamic studies carried out on cultures of peripheral lymphocytes have also found a very different sensitivity to the action of the steroid from subject to subject. Consequently, different doses of the drug should be required to achieve the same pharmacological effect.<sup>25</sup> All these aspects show us the complexity of the problem, and how the empirical reduction of the dose of prednisolone alone cannot guarantee the same efficacy and safety for all patients.

All clinical studies that have dealt with the discontinuation of the steroid have always excluded patients at high immunological risk. However, a recent meta-analysis reported results in favor of steroid discontinuation even in subjects considered to be at high immunological risk.<sup>26</sup> GN-IgA is also considered as a contraindication to the steroid discontinuation. An association was reported between steroid discontinuation and an increased risk of GN-IgA recurrence.<sup>27</sup> Subsequently, many other studies have confirmed this finding<sup>28-30</sup>, while a few others have excluded it.<sup>31</sup> The ABO-incompatible living transplantation represents one of the contraindications to steroid-free therapy as it is considered to be at greater risk of acute rejection. Today we know that late discontinuation has an undoubted advantage, that of selecting patients to discontinue the steroid, and this results in a lower incidence of acute rejection compared to early discontinuation.<sup>32</sup> The selection consists in excluding from discontinuation the patients with one or more episodes of acute rejection, or those impaired or unstable renal function. In some protocols, a follow-up renal biopsy is also provided before discontinuation of the steroid.<sup>33</sup>

In clinical practice, the late discontinuation of the steroid results in greater difficulty in outpatient management of the patient, precisely in a period in which simplification of monitoring procedures should be applied instead. Early discontinuation allows to avoid many of the limitations reported above and,

therefore, simplifies the clinical management of the patient, in the context of, as already mentioned, a greater risk of acute rejection. However, in early discontinuation episodes, acute rejection occurs mainly during the first month, when outpatient checks are frequent and, therefore, without repercussions on normal procedures. Today, early discontinuation is preferred to immediate discontinuation because it facilitates the clinical management in the immediate post-transplantation period and reduces the risk of acute rejection.<sup>34</sup> The latter point was further confirmed by a recent randomized study comparing the two different ways of avoiding steroids, with the primary objective being the incidence of diabetes, which was comparable.<sup>35</sup>

A further aspect to be considered concerns the necessity or not of induction therapy in candidates for steroid discontinuation after transplantation. Induction therapy is strongly recommended by current guidelines in cases of early steroid discontinuation<sup>36</sup> and has always been included in all proposed protocols over the years. In cases of late discontinuation, this recommendation does not apply, although it may be useful in increasing the percentage of subjects eligible for discontinuation, due to a likely lower incidence of acute rejection and better renal function.

## CONCLUSION

The results obtained do not allow to reach a single and definitive conclusion, due to the many aspects involved, and to which more or less importance can be given. In summary, however, it can be stated that steroid toxicity is a complex effect that is difficult to measure with a single parameter. High inter-individual variability of prednisolone pharmacodynamics should suggest personalization of therapy. The reduction of the daily dose of prednisone or its equivalent has certainly reduced the degree of toxicity of the drug, but it has not eliminated the problem of side effects and their impact on the quality of life of many patients and on their cardiovascular risk profile. The best solution to the problem could be offered by the discontinuation of the drug, which is possible in many patients classified as patients at low immunological risk. In these patients, the increased risk of acute rejection may be largely offset by the benefits deriving from the absence of steroid toxicity.

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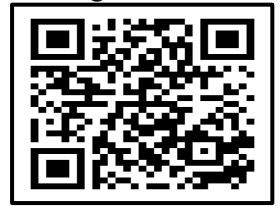
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# Assessment of Oral Health Status among Orphanage Children (Underprivileged Population): A Descriptive Cross-Sectional Study

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**INTRODUCTION:** An orphan is a child under 18 year who has lost both parents or has been abandoned by them. Such children are deprived of the parental love and care and get little health care as well as their oral cavity is generally neglected.

**AIM:** To assess the dental caries experience, oral hygiene status and periodontal status among the orphanage children in Prakasam District, Andhra Pradesh, India.

**MATERIALS AND METHOD:** A cross sectional study among 485 orphan children of various institutes ranged from 12 to 16 years where WHO oral health assessment form 2013 was used and chi-square test and descriptive statistics test were used for statistical analysis by using SPSS 22.0 software.

**RESULTS:** It was seen that 73.4% were having dental caries and the mean DI-S scores, CI-S scores and OHI-S scores were  $1.41 \pm 0.47$ ,  $1.07 \pm 0.47$  and  $2.48 \pm 0.92$  respectively. The prevalence and severity of gingival bleeding was found to be more i.e. 64.7% among them.

**CONCLUSION:** Majority of orphan children were suffering from oral problems. Oral health fraternity should actively involve with other parts of the community in order to maintain oral care of this group.

**KEYWORDS:** Dental Caries, Oral Health, Orphanage, Children, Periodontal.

## INTRODUCTION

Despite immense improvements in the oral health of populations various worldwider problems still persist such as dental decay, periodontal conditions, tooth loss, etc.<sup>1-3</sup> Oral disease pattern is dependent on various socioeconomic characteristics like social, cultural, economic and ethnic factors.<sup>4,5</sup> It has been said through various studies that parents are the primary caretakers and saviours of a child which greatly influence the development of general and health related behaviour. However, there is a section in the society where unhappily many of the children have to lead their lives without parents, the later either being dead or incapable of bringing up their children, such section of the society is called as orphans.<sup>6,7</sup> An orphan is a child under 18 year who has lost both parents or has been abandoned by them.<sup>8</sup> Such children are deprived of the parental love and care which is received by those living with their parents.<sup>9</sup>

The orphans get little health care and oral cavity is the most neglected aspect of children living in orphanage.<sup>10</sup> In these children, absence of family support might influence their oral health behaviour which lead to poor quality of life.<sup>11</sup> Even few studies also reported that children in orphanages revealed a high prevalence of dental caries, dental trauma and gingivitis.<sup>12,13</sup> Poor oral health among these children can be associated

with a number of factors, including uneven and limited access to oral health care, lack of quality measures in oral health care, inadequate health literacy, and lack of attention to oral health among primary care providers.<sup>14</sup> Poor living conditions in orphanages where children live might also be related to many complex oral health problems.<sup>15</sup> Thus, acquiring information on the medical and dental health status of orphan children will help to provide a better understanding of the medical and dental health problems of an overlooked segment of the society. It will also help in preventing and determining the treatment needs that suit this population. Very few studies have been reported in India so far in order to assess the oral health status of the orphan children. Thus, the present descriptive cross-sectional study was carried out with aim to assess the oral health status of orphan children.

## MATERIALS AND METHOD

**Study setting and population:** A cross-sectional descriptive epidemiological survey was carried out to assess and the dental caries experience using dentition status and treatment needs, Oral Hygiene Status using Simplified Oral Hygiene Index, periodontal status using CPI index using WHO Proforma 2013 among the 485 orphanage children aged from 12 to 16 years among orphanages in Prakasam District, Andhra Pradesh,



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India by using stratified cluster random sampling technique.

#### Inclusion Criterion:

- Children who had given informed consent were examined.
- Children who are present on the day of examination.

#### Exclusion criteria:

- Children who refused for the dental check-up and where it was difficult to carry out were excluded from the study.
- Children who are intellectually disabled.

**Ethical clearance and institution consent:** Prior to the start of the study, ethical clearance for the present study was obtained after presenting the brief protocol of the study and before the start of the survey, official permission was obtained from head of the orphanages after duly explaining the purpose and methodology of the study. Later on, a written informed consent was obtained from the caretakers of the study participants.

**Statistical Analysis:** The recorded data was entered in the Microsoft Excel and analyzed using the SPSS Version 22.0. Descriptive statistics that included mean, standard deviation and percentages and chi square tests were calculated for each of the categories. Level of significance was fixed at 0.05 or less.

## RESULTS

In this cross-sectional study, 104(21.5%) were in 12-14 year age group, 213(43.9%) were in 14-16 year age group and 168(34.6%) were in 16-18 years age group. It was also seen that majority of the subjects 472(97.3%) had no past dental visit. Only 13(2.7%) had visited dentist once/year (Table 1).

Brushing Frequency / day	Orphanage children		Chi square value	P value
	Number	Percentage		
Never	78	16.1	1.521	0.001*
Once	407	83.9		
Twice	0	0		

**Table 1.** Brushing Practices Among Orphans

The use of oral hygiene aids among orphans is depicted in table 2. A majority of the orphans (74%) used toothbrush with toothpaste, while the least (0.2%) used

toothbrush with powder. Alarmingly, still 13.6% and 12.2% of orphans were using toothpaste and powder with their finger. These observations were found to be statistically significant( $p=0.003$ ).

Oral Hygiene Practice	Orphanage children		Chi Square value	P value
	Number	Percentage		
Toothbrush with toothpaste	359	74	2.12	0.003*
Toothbrush with powder	1	0.2		
Finger with toothpaste	66	13.6		
Finger with powder	59	12.2		

**Table 2.** Use Of Oral Hygiene Aids Among Orphans

Dental caries (table 3) was observed in 73.6% of the orphans with a mean DMFT of  $1.32 \pm 1.12$ . The differences were found to be statistically significant ( $p=0.002$ ).

Dental Caries	Orphanage children		Chi square value	p value	Mean DMFT
	Number	Percentage			
Absent	129	26.6	2.229	0.002*	1.32±1.12
Present	356	73.4			

**Table 3.** Dental Caries Among Orphans

Upon assessment of the oral hygiene scores based on OHI-S, most orphans reported a “good” DI-S score (46.4%), followed by “fair” CI-S scores (43.7%) and “poor” OHI-S scores (51.1%) and is depicted in table 4.

Assessment of gingival bleeding scores among the orphans (table 5) revealed the presence of bleeding in 64.7% of the orphans and this difference was found to be statistically significant ( $p=0.002$ )

## DISCUSSION

The orphans are socially and economically deprived and they rarely get an opportunity to seek dental care. The orphans get little health care and oral cavity is the

Oral Hygiene Index (S) Scores	Orphanage children		Level of Oral Hygiene	Number	Percentage
	Mean	Standard Deviation			
DI-S Score	1.41	0.47	Good	225	46.4
CI-S Score	1.07	0.47	Fair	212	43.7
OHI-S Score	2.48	0.92	Poor	248	51.1

**Table 4.** Oral Hygiene Scores Based On OHI-S And Level of Oral Hygiene Among Orphans

most neglected aspect of children living in an orphanage.<sup>12</sup> This cross-sectional study consisted of 485 orphans and the majority of study group, were aged 14-16 years age group i.e.43.9% with mean age of the orphanage children was 14.75±1.87 years. This finding is in agreement with the study done by Sharma A et al.(2014)<sup>16</sup> in Jaipur and Al Maweri et al.(2014)<sup>13</sup> in Yemen in which the majority of the study participants were aged 15 years. The information on past dental history revealed that 97.3% orphanage children had never consulted the dentist as of lack of awareness about the significance of oral health among orphanage children and their care takers may be not taking oral care into serious consideration which influence the dental service utilization.

Gingival Bleeding	Orphanage children		Chi Square Value	p Value
	Number	Percentage		
Present	314	64.7	5.155	0.002* (Significant)
Absent	171	35.3		

**Table 5.** Orphans with Presence and Absence of Gingival Bleeding

It was observed through this study that 73.4% of the orphanage children had decayed teeth with mean DMFT 1.32±1.12 at statically significant level and results are in agreement with study done by Al-Obaidullah A et al (2016)<sup>17</sup> and disagreement with Mohan A et al. (2014)<sup>18</sup> in Lucknow where only 43.7% orphanage children were having decayed teeth. This might be due to the fact that orphanage children in India are usually engaged by various NGOs or social workers and many times they don't even realize that oral health is main and foremost part of child's wellbeing.

The present study also revealed that the mean oral hygiene index score among orphans was 2.46±1.12. This finding is in agreement with the study conducted by Al-Jobair AM (2013)<sup>15</sup> in Saudi Arabia. Even majority of

orphanage children (68.5%) had poor oral hygiene status which may be due to the fact that orphans children may be find difficult to maintain their own oral hygiene due to limited or unavailability of the oral hygiene products. As majority of the studied population were having poor oral hygiene which results higher prevalence of gingival bleeding too, i.e. 64.7%. Thus, findings in this study highlight that the overall oral health status was poorer in orphanage children.

If good oral health is to become a reality in the future for people with special needs, it is essential that people in daily contact with the children become involved in oral care. With increasing number of people with special needs, the oral health fraternity should actively involve with other parts of the community to bring about general and social wellbeing and benefit them with sustained lifetime oral health. Further more detail studies are necessary to assess more effective modalities for proper oral health care in this population.

## CONCLUSION

Majority of orphan children were suffering from oral health related problems. Most common hard tissue finding was dental caries in orphanages. To improve the oral health status a combined strategy that deals with current disease load and helps to prevent the further occurrence of disease in the long run is needed.

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# Knowledge and Attitude about Radiation Effects on Pregnant Women among Medical Students

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**INTRODUCTION:** Radiation and safety aspects while during pregnancy are always a matter of concern. It is required for medical students to learn about the various effects of radiology as ionizing radiation are carrying strong biological effects on pregnant females.

**AIM:** To assess the awareness level among medical students regarding radiation risks for pregnant women.

**MATERIALS AND METHODS:** This Questionnaire based cross sectional study was conducted among 250 medical students in one medical institute in India. Questionnaire consisted of knowledge and attitude related questions regarding effects of radiation on pregnancy and collected data was analyzed by using SPSS and descriptive statistics and chi square test was used for further analysis.

**RESULTS:** In the present study, MBBS students were 60 (24%) and BDS were 190 (76%). 100% MBBS students reported that X-rays are destructive to pregnant females in comparison to only 90% BDS students ( $p=0.01$ ). Both 75% MBBS and 70% BDS students "strongly agreed" to the fact that "Education and training programmes should be conducted for increased awareness among medical professionals regarding the radiation effects in pregnant females (Non-significant).

**CONCLUSION:** Although medical students were aware about radiology and pregnancy related effects but still there is room for improvement.

**KEYWORDS:** Dental, Radiology, X-Rays, Biological Effects

## INTRODUCTION

Ionizing radiations are carrying damaging effects especially biological either directly or indirectly through the production of free radicals.<sup>1</sup> High-dose ionizing radiations (x-ray) are having mutually deterministic as well as stochastic effects. In contrary to lower doses, radiation hazards are primarily stochastic rather than deterministic.<sup>2</sup> Nonstochastic or deterministic are those where there is determined dose above which the destructive abuse starts to appear whereas among stochastic effects there is no deterministic dose that could lead to biological damage.<sup>1,3</sup>

In order to avoid these harmful effects of radiations, risk/benefit concept has been developed by the International Commission on Radiological Protection(ICRP) since 1977 which recommends exposures must be reasonable and kept as low as possible for all the patients. Hence, ALARA principle "As Low as Reasonably Achievable" should be kept in mind while during regular work practice.<sup>2,4</sup>

Choosing the most apposite imaging modality and radiation exposure while during the pregnant female is a frequent clinical question and the management of such patients are multifaceted topic.<sup>5</sup> Pregnant women are commonly anxious and used to be concern about the fetus and various risks or malformations associated

with radiation exposure.<sup>1,5</sup> However, no radiography procedure should be carried out on pregnant women unless there is an absolute necessity.<sup>1</sup> All techniques for minimizing the absorbed dose should be undertaken and radiographs should be provided with well-collimated beams in precisely-protected shields. A high-kVp technique is appropriate in such cases.<sup>3</sup>

Radiation risks all through the pregnancy which is strongly related to the pregnancy stage and the absorbed dose.<sup>1</sup> Most of the biologic responses to radiation occur during the first two weeks of pregnancy, which is a period when the mother is unaware of her pregnancy, and these responses lead to miscarriage of the fetus. Therefore, there is no concern about congenital abnormalities during the first two weeks of pregnancy.<sup>1,5,6</sup> But being into medical profession person should be able to know about the radiation safety and best possible methods especially during pregnancy time as radiology is a decisive part of clinical medicine with a strong contribution in clinical care. Although radiology-specific objectives have also been incorporated into medical curriculum in recent years, but still many of the medical students are not much aware about the radiation dosage safety. It has been reported through literature that many dentists post-pone dental treatments to the period after delivery because they do not have sufficient knowledge



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of the low doses involved in diagnostic dental radiation.<sup>7,8,9</sup> The delay in treatment might have adverse effects on the mother and the fetus. The aim of the present study was to assess the awareness level among medical students (MBBS and BDS) regarding radiation risks for pregnant women

## MATERIALS AND METHOD

This questionnaire based cross sectional study was conducted at a medical college in India (name withheld on request) among 250 medical students of one of the medical institutes in India. All of the eligible subjects were included in the study without discrimination. Ethical approval was received from the institutional review board and informed written consent was obtained from all the study participants.

Data was collected by sending questionnaires through email, phones and by distributing personally to the students. The questionnaire consisted of 18 questions about the awareness of the risk of radiation among pregnant women. The questionnaire consisted of questions regarding the safe dose for fetus, radiation protection principles, radiation dose on pregnancy termination all of which result in reduced radiation dose to pregnant women. The collected data were analyzed using SPSS (Statistical Package for Social Sciences) software, version 22.0 (SPSS Inc., Chicago, IL, USA) with the help of descriptive statistical tests and chi square test was used and the level of significance was set at  $p \leq 0.05$ .

## RESULTS

In this cross-sectional study, the mean age of the subjects was  $21.82 \pm 2.78$  years. Among 250 dentists 159 were females and 91 were males whereas MBBS students were 60 (24%) and BDS were 190 (76%). While assessing the knowledge regarding radiation effects on pregnant women among studied subjects, 100% MBBS students reported that X-rays are destructive to pregnant females in comparison to only 90% BDS students and the difference was found to be significant ( $p=0.01$ ). Another interesting observation was seen while answering the question "Do you know about safe dosage of radiation?", only 6.67% of MBBS students reported not knowing it, in comparison to 82.1% of BDS students who did not know the safe radiation doses ( $p=0.01$ ). Responses to other questions on knowledge is depicted in table 1.

Upon accessing the attitude regarding radiation effects on pregnant women (table 2), 1.05% of BDS students reported Neither agree nor disagree on the question "Do you think so X-rays should be avoided in the pregnancy" ( $p=0.002$ ). Both 75% MBBS and 70% BDS students "strongly agreed" to the fact that "Education and training programmes should be conducted for increased awareness among medical professionals regarding the radiation effects in pregnant females" and the difference was found to be non-significant.

## DISCUSSION

Cancerous conditions, abortion, fetus mutagenic changes, cataracts, etc are strongly associated with radiation exposure. The radiation effect could be stochastic which can lead to episode of biological hazards.<sup>4,5</sup> Henceforth, the radiation protection protocol should be followed and medical personnel should be restricted to the ALARA principle concept which keeping radiation exposure "As Low As Reasonably Achievable".<sup>4</sup>

So, a scrupulous knowledge about the biological hazards of X-Rays is required and considering this, in the present study, knowledge of medical students is assessed regarding the effect of radiation among pregnant women. The present studies revealed that majority of the medical students consider x rays to be harmful. Comparatively it is an elevated percentage especially for the MBBS students compared to the dental students, which could be due to strong course regarding radiology medicine with special emphasizing on biological hazards and different methods of protection. It's been seen through this study 30% of MBBS and 52.4% of dental students know that X-rays does not lead to preterm birth and low birth weight at moderate significant level and results are supported by the study by Mortazavi SMJ et al.<sup>10</sup> that there was no statistical significant differences between the mean weight of new-borns whose mothers had been bare to some common sources of ionizing and non-ionizing radiations and those who were not exposed. However, the findings of the current study cast quail on preceding reports, which indicated that exposure to ionizing radiation during pregnancy increased the risk of low birth weight.

In the current study, 62.3% MBBS and 2.63 % dental students were aware of the safe dose of radiation for the fetus and around 44.3% of dental students and 78.3 %

Question	Response	MBBS	BDS	P value
X rays are destructive for pregnant Females?	YES	60 (100%)	180 (94.73%)	0.01**
	NO	0 (0%)	10 (5.26%)	
Are Radiographs carrying deterministic and stochastic effects on the pregnancy?	YES	50 (83.3%)	140 (73.68%)	0.05**
	NO	10 (16.6%)	50 (26.31%)	
Radiation causes preterm birth and low birth weight in foetus?	YES	18 (30%)	103 (54.21%)	0.01*
	NO	42 (70%)	87 (45.78%)	
Do you know about safe dosage of radiation?	YES	56 (93.3%)	34 (17.9%)	0.01*
	NO	4 (6.67%)	156 (82.1%)	
Do you know about ALARA-protection principle?	YES	47 (78.3%)	85 (44.73%)	0.44
	NO	13 (21.6%)	105 (55.26%)	
Are you alert about safety methods like high speed films, lead aprons, digital radiography	YES	54 (90%)	185 (97.36%)	0.2
	NO	6 (10%)	5 (2.63%)	
Do you know about the time period in which the fetus is most sensitive to radiation?	YES	56 (93.3%)	160 (84.21%)	0.78
	NO	04 (6.67%)	30 (15.79%)	
Are you aware of the threshold radiation doses for the pregnancy termination?	YES	37 (62%)	5 (2.63%)	0.000*
	NO	23 (38%)	185 (97.37%)	

**Table 1.** Knowledge regarding radiation effects on pregnant women among studied subjects (\* statistically significant)

MBBS were aware of the protection principles of ALARA. This means that about 50% of dental students were unaware of occurrence of radiation biological damage. Even current studies designate that the first semester is the mainly sensitive period during pregnancy, and exposure can lead to definitive defects.<sup>3,11</sup>

It has been seen through the current study that medical students both the MBBS and dental stated that pregnant women should not undergo radiographic procedures unless there is an absolute necessity for it and if procedure should be undertaken; all the

necessary precautions should be exercised in order to minimize the radiation dose and effects.<sup>3,12</sup> It has been also observed that majority of the medical students were having positive attitude towards obligatory accreditation and monitoring by regulatory bodies of the dental and medical clinics using radiography. Although students were having moderate knowledge and positive attitude towards radiation protection related measures still there is room for improvement. Awareness education programs should be planned to increase their knowledge of the safety of radiographic procedures and the use of protective techniques in pregnant women.



Question	Course type	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree	p value
Do you think so X-rays should be avoided in the pregnancy	MBBS	7 (11.7%)	53 (88.3%)	0	0	0	0.002*
	BDS	123 (64.73)	65 (34.21)	2 (1.05%)	0	0	
X- rays should only be taken with proper protection techniques if highly necessary	MBBS	54 (90%)	04 (6.67%)	02 (3.33%)	0	0	0.000*
	BDS	66 (34.74%)	122 (64.21%)	02 (1.05%)	0	0	
Education and training programmes should be conducted for increased awareness among medical professionals regarding the radiation effects in pregnant females	MBBS	45 (75%)	15 (25%)	0	0	0	0.25
	BDS	133 (70%)	55 (28.94%)	2 (1.06%)	0	0	
Do you think so there should be compulsory accreditation and monitoring by regulatory bodies of the dental and medical clinics using radiography	MBBS	40 (66.67%)	20 (33.33%)	0	0	0	0.001*
	BDS	70 (36.84%)	117 (61.57%)	03 (1.57%)	0	0	

**Table 2.** Attitude regarding radiation effects on pregnant women among studied subjects (\* statistically significant)

## CONCLUSION

It has been concluded through the current study that though medical students were having judicious knowledge and optimistic attitude towards radiology medicine but still necessitate strengthening the importance of radiation risks and protection measures among pregnant women in the dental curriculum in India. Even continuing education and training programs should be conducted at customary intervals for stringent observance of different radiographic protection regulation protocols for pregnant women.

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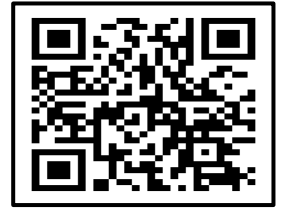
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# Oral Manifestations among Diabetic Patients: A Cross-Sectional Study

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**INTRODUCTION:** Diabetes, ranked as the ninth most common disorder has the potential to greatly affect the oral health of a person if not taken care of on a routine basis.

**AIM:** To assess the prevalence of oral manifestations in diabetic participants of Sunder Nagar town, Himachal Pradesh, India.

**MATERIALS AND METHOD:** This online, questionnaire based cross-sectional study was conducted using a combination of convenience and snowball sampling among diabetics. The questionnaire was pre-tested and pre-validated, contained 16 questions which included self-reported oral health status of the people. The student's t-test and Pearson's correlation were applied to find out significant associations, if any. Data was analysed using SPSS version 21.0 and significance (p) was kept significant at  $\leq 0.05$ .

**RESULTS:** Out of a total of 180 complete responses, 8.3% were type 1 diabetics, 72.8% were type 2 diabetics and the rest 18.9% didn't know their diabetic status. 71.7% of patients experienced bad breath, out of which 66.7% experience it early in the morning, 16.1% during the daytime, 5% every time, 12.2% never ( $p=0.02$ ). 24.4% of the participants experienced burning mouth sensation, while 57.8% of participants experienced dry mouth (less salivation). 20.6% of the participants reported white patches over their tongue while 8.3% reported having white patches over the inner cheeks (buccal mucosa) and was found to be statistically significant ( $p=0.01$ ). 58.9% of the diabetics were found to be non-smokers while 21.7% were occasional smokers and 11.1% were chain smokers.

**CONCLUSION:** There is a need to educate diabetics regarding the effects of this disease on their oral health and the need to maintain proper hygiene.

**KEYWORDS:** Diabetes, Oral, Manifestations

## INTRODUCTION

Humankind has always tried to emphasize on the fact that "the greatest wealth is health". This is further strengthened by the definition of health by the World Health Organization (WHO), which states that "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity." Over the last several decades, our diets have become unhealthy, our lifestyles sedentary and many of us still use tobacco and abuse alcohol which has resulted in an ever-increasing prevalence of lifestyle diseases. As per WHO estimates, Noncommunicable Diseases (NCDs) kill 41 million people each year, which is equivalent to 71% of all deaths globally. Among these NCDs, one such disease is diabetes which is ranked as the ninth most common disorder amassing a 68% increase between 1990 to 2010.

Experts believe that between the years 2010 and 2030, the number of adults with Diabetes Mellitus (DM) in developing countries is expected to increase by a whopping 69%.<sup>1</sup> Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb

amputation. According to WHO, in the year 2019, diabetes was the ninth leading cause of death causing an estimated 1.5 million deaths as a result of this disease.<sup>2-4</sup>

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar). Two main types Type 1 diabetes (Lack of insulin) and Type 2 diabetes (ineffective insulin).<sup>1</sup> According to WHO, 422 million people worldwide have diabetes, particularly in low-and middle-income countries and Diabetes is one of the leading causes of death.<sup>5</sup> A healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes. It can be treated and its consequences avoided or delayed with the aid to proper diet, regular physical activity, medication and regular screening for complications at regular intervals. Diabetics who smoke are at an even higher risk, of up to 20 times to develop thrush and periodontal disease as compared to their non-smoking counterparts. Among diabetics, smoking has been found to impair blood flow to the gums, thus affecting



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wound healing in this tissue area.<sup>6</sup>

Oral health has been identified as a key indicator of one's overall health, general well-being and assessing one's quality of life. As per the Global Burden of Disease Study (2017), oral diseases has been found to affect 3.5 billion people across the globe.<sup>1,2,6</sup> The International Agency for Research on Cancer, has reported that cancers pertaining to the lip and oral cavity are among the top 15 most common cancers, with nearly 180,000 deaths each year across the world.<sup>6,7</sup> It is a well-documented fact that most oral diseases and conditions share alterable risk factors with leading noncommunicable diseases and a variety of oral health conditions are largely preventable and can be treated in their early stages through proper screening or regular dental check-ups.

As per scientific evidence, the oral manifestations are among diabetics ranges from periodontal diseases, caries/periapical periodontitis, tooth loss, peri-implantitis, dry mouth (xerostomia), candidiasis, taste disturbances, burning mouth syndrome and cancer.<sup>8,9</sup> Due to a paucity of data, the present study was carried out with the aim to assess the prevalence of oral manifestations in diabetic participants of Sunder Nagar town, Himachal Pradesh, India.

## MATERIALS AND METHOD

An online, cross-sectional study was conducted on diabetic participants of Sunder Nagar town through a combination of convenience and snowball sampling. The study was conducted for a period of one month in the month of July, 2021. Data was collected using a pre-tested and pre-validated questionnaire containing 16 questions which included self-reported oral health status of the people. The questionnaire was available in both Hindi and English languages, and willing participants were first directed to a page explaining the study objectives as well as a button, which upon clicking signified their consent to participate in the study. A pilot study was conducted amongst fifteen subjects to validate the questionnaires and make subsequent adjustments. The data of these subjects was analysed with the main study participants and not included in the final analysis.

Participants were free to leave the questionnaire in between and only complete responses were accepted for analysis. Upon submission of the form, if a participant failed to answer  $\geq 1$  question(s) it was removed from the analysis.

Data was tabulated and the student's t-test and Pearson's correlation were applied to find out significant associations, if any. Data was analysed using SPSS version 21.0 and significance (p) was kept significant at  $\leq 0.05$ .

## RESULTS

The age and diabetic status of the participants is depicted in table 1. Out of a total of 180 complete responses, 7.18% were above 15 years and below 39 years, 72.38% were above 40 years and below 63 years and the rest 19.89% were above 64 years and below 81 years. Out of these 180 participants, 8.3% were Type 1 diabetic, 72.8% were Type 2 diabetic and the rest 18.9% didn't know their diabetic status.

n, %	
Age (In years)	
15-39	13(7.18%)
40-63	131(72.38%)
>64 years	36(19.89%)
Diabetic status	
Type 1	15(8.3%)
Type 2	131(72.8%)
Don't know	34(18.9%)

**Table 1.** Age and Diabetic Status of the Participants

Table 2 reveals the self-reported oral manifestations of the participants. It was reported that 71.7% of participants experienced bad breath, out of which 66.7% experience it early in the morning, 16.1% during the daytime, 5% every time, 12.2% never and the difference was found to be significant ( $p=0.02$ ). A total of 24.4% of the participants experienced burning mouth sensation, while 57.8% of participants experienced dry mouth (less salivation). Among these participants, 20.6% had white patches over their tongue while 8.3% reported having white patches over the inner cheeks (buccal mucosa), which was found to be statistically significant ( $p=0.01$ ).

Table 3 reveals the self-reported dental health of the participants, and it was found that 20% out of them reported having swollen gums while 23.9% experienced it sometimes. A majority of the participants (70.5%) had a teeth count ranging from 23 to 32. 45% of participants had good oral hygiene and didn't experience any pain while eating, drinking, and

Oral Manifestations	Responses				p-value
Bad breath If yes, when	Yes- 129(71.7%) Early morning- 86 (66.7%) Daytime- 20(16.1%) Every time- 7(5%) Never- 16(12.2%)	No- 22(12.2%)	Sometimes- 27(15%)	Never-2( 1%)	0.02*
Burning mouth Sensation	Yes- 44(24.4%)	No- 90(49.4%)	Sometimes- 44(24.4%)	I don't know- 2(1%)	0.08
Dry mouth ( less salivation)	Yes- 105(57.8%)	No- 40(22.2%)	Sometimes- 33(18.3%)	I don't know- 2(1%)	0.05
White patches over Tongue	Yes- 37(20.6%)	No- 122 (67.8%)	Maybe- 15(8.3%)	I don't know – 6(3.3%)	0.87
White patches over Inner cheeks	Yes- 15(8.3%)	No- 142(78.9%)	Maybe- 11(6.1%)	I don't know- 12(6.7%)	0.01*

**Table 2.** Self-Reported Oral Manifestations of the Participants

brushing, while 17.8% did so. A total of 21% of participants experienced sensitivity while eating/drinking and brushing, while 27.2% of participants experienced intermittently bleeding from the gingiva. Upon statistical analysis, none of the responses were found to be statistically significant.

Habits of the participants in relation to smoking and alcohol consumption is depicted in table 4, and it was observed that 58.9% were non-smokers, 21.7% were occasional smokers and 11.1% were chain smokers, while 60% of the respondents reported never drinking alcohol.

Table 5 reveals the self-reported oral hygiene practices of the participants. Regarding their dental check-up

status, 43.3% were regular visitors, while 37.2% of participants had 'never visited' a dental facility. The relationship between oral hygiene practices and dental visit status was found to statistically significant ( $p=0.01$ ).

Analysis of relationship between diabetes and other variables using the Pearson's correlation coefficient revealed a positive, linear relationship with the scores of oral manifestation ( $r=+0.66$ ,  $p=0.02$ ) and oral hygiene (table 6).

## DISCUSSION

Based on the results of the present study, it can be concluded that over half of the participants have

Self-Reported Dental Health	Responses				P value
Swollen gums	Yes- 36(20%)	No- 97(53.9%)	Sometimes- 43(23.9%)	Every time- 4(2.2%)	0.66
Total number of Teeth present	(0-10)- 25(13.73%)	(11-22)-28( 15.5%)	(23-32)- 127(70.5%)		0.76
Pain in gums/teeth	While eating/drinking- 32(17.8%)	While brushing- 32(17.8%)	Both- 35(19.4%)	None- 81( 45%)	0.65
Sensitivity in gums/teeth	While eating/drinking- 42(23.3%)	While brushing- 30(16.7%)	Both- 38(21.1%)	None- 70(38.9%)	0.88
Bleeding gums	Yes- 27(15%)	No- 99(55%)	Sometimes- 49(27.2%)	Every time- 5(2.8%)	0.87

**Table 3.** Self-Reported Dental Health of the Participants

Habits				
Smoke cigarettes/tobacco	Daily- 20(11.1%)	Occasionally- 40(21.7%)	Never- 105, (58.9%)	Stopped- 15,(8.3%)
Drink alcohol	Daily- 8(4.15%)	Occasionally- 57(31.7%)	Never- 108,(60%)	Stopped- 7,(4.15%)

**Table 4.** Habits of the Participants in Relation to Smoking and Alcohol Consumption

practices found to be statistically adequate oral health knowledge related to diabetes.

While reporting their oral manifestations, 71.7% of participants experienced bad breath, out of which 66.7% experienced it early in the morning, while 16.1% experienced it during the daytime, 5% experiencing it every time, and 12.2% never reported having bad breath. These findings are higher as compared to a study where halitosis was reported only in 23.3% of their diabetic patients.<sup>10,11</sup> Modification in diet is often advised for participants with diabetes to prevent these and other symptoms associated with diabetes as the restricted consumption of carbohydrates may have a non-cariogenic effect as it has been reported that the anti-microbial defence capacity of saliva is not weakened in diabetes.<sup>2,3,9</sup>

Self-reported dental examination revealed a prevalence of swollen gums in 20% (36) among the participants, with 23.9% of them experiencing it sometimes, while 27.2% of the participants experience d intermittent bleeding from their gingiva. These findings are in agreement to Bissong M et al, who reported 23.5% of their diabetic patients suffering from. Overall in their study, gingivitis, periodontitis and oral candidiasis was significantly higher in diabetics as compare to their non-diabetic counterparts.<sup>12</sup> An encouraging fact was that 45% of the participants with good oral hygiene didn't experience any pain while eating, drinking, and brushing.

In the present study, 58.9% of the diabetics were found to be non-smokers with 21.7% of them being occasional

are in agreement to Thresia CU et al.<sup>13</sup>, who reported that a significant proportion (59%) of diabetes patients in their study were tobacco consumers prior to their diagnosis and alarmingly, more than half of them continued to use tobacco on a daily basis even after their diagnosis.

Oral health care is conventionally disease-oriented, curative, and serves limited people due to high costs. Given the burden of unmet dental care needs and their association with systemic conditions, it is propagated that these services should primarily be based on education to increase awareness and influence the attitude of the people in seeking oral health care. Our study is among the few studies in its region to have followed a comprehensive approach by integrating oral health with NCDs.<sup>10,12</sup>

This study is prone to certain limitations. The first being the self-reported nature of the data collected, however, keeping the pandemic in mind, patients might be apprehensive to get their oral screening done. The second limitation being the inadvertent over/under reporting of information by respondents. To counter this, no personal data was collected by the participants and hence, the results of the present study can be generalized.

## CONCLUSION

Based on the results, it can be concluded that there is a need to educate diabetics regarding the effects of this disease on their oral health and the need to maintain proper hygiene. This can be achieved through individual patient care among those visiting dental clinics for treatment or through various community based programmes.

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Oral hygiene					p-value
Dental checkup	Yes- 78(43.3%)	No- 67(37.2%)	May be- 15(8.3%)	Sometimes- 20(11.1%)	0.01*
Tooth brushing	Once a day- 133(73.9%)	Twice a day- 40(22.2%)	After every meal- 5(2.9%)	Never- 2( 1%)	0.98
Mouth washing	Yes- 27(15%)	No-96( 53.3%)	Sometimes- 48(26.7%)	Never- 9(5%)	0.44

**Table 5.** Self-Reported Oral Hygiene Practices of the Participants



Relationship between diabetes and	r value	p-value
Age	+0.54	0.34
Oral Manifestations	+0.66	0.02*
Dental Health	+0.23	0.98
Habits	+0.77	0.78
Oral hygiene practices	+0.46	0.01*

**Table 6.** Analysis of relationship between diabetes and other variables using the Pearson's correlation coefficient

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