



## Knowledge, Attitude, and Practice of Pregnant Women regarding Oral Health Status and Treatment Needs following Oral Health Education in Pune District of Maharashtra: A Longitudinal Hospital-based Study

<sup>1</sup>Roshani M Chawla, <sup>2</sup>Sahana H Shetiya, <sup>3</sup>Deepti R Agarwal, <sup>4</sup>Pranjan Mitra, <sup>5</sup>Nikhil A Bomble, <sup>6</sup>D Satya Narayana

### ABSTRACT

**Introduction:** Pregnancy is a natural process that may create some changes in different parts of the body including the oral cavity. These changes will lead to oral diseases if enough and timely care of oral cavity is not taken. Women may experience increased gingivitis or pregnancy gingivitis beginning in the second or third month of pregnancy that increases in severity throughout the duration of pregnancy. To motivate the patient toward oral health and implement the needed prophylactic measures, a longitudinal study was planned to observe the effect of oral health education during pregnancy on knowledge, attitude, practice, oral health status, and treatment needs (TNs) of pregnant women belonging to different socioeconomic groups.

**Materials and methods:** A longitudinal study was conducted among 112 pregnant women belonging to different

socioeconomic groups to assess the effect of oral health education on knowledge, attitude, practice, oral health status, and TNs. The demographic details, knowledge, attitude, and practice of pregnant women, and oral health status were collected through a predesigned questionnaire by a principal investigator through an interview. Oral health examination was carried out to assess oral health status using revised World Health Organization Proforma 1997, and oral health education was given through PowerPoint presentation to the participants in local language, i.e., Marathi, after collecting the baseline data. Reinforcement of oral health education and blanket referral was done at 14th week, and follow-up data were collected at 28th week of gestation. The demographic details, such as age, sex, education, occupation, income, and the questions based on knowledge, attitude, and practice among participants were analyzed using number, percentage, and mean.

**Results:** At baseline, knowledge was limited, attitude was positive, while the practice was poor regarding oral health care during pregnancy in pregnant women belonging to different socioeconomic groups. After oral health education and blanket referral, at 28th week of gestation, knowledge regarding oral health care improved drastically, attitude toward oral health became more positive, whereas practice did not change much among all the pregnant women belonging to different socioeconomic groups, probably indicating sociocultural influences.

**Conclusion:** Intensive oral health education during pregnancy leads to drastic improvement in knowledge and attitude. Practice, gingival health, and the number of filled teeth also improved to some extent.

**Clinical significance:** Regular oral health education programs should be conducted at community level among pregnant woman to reduce the burden of oral diseases.

**Keywords:** Oral health, Pregnancy, Socioeconomic groups.

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<sup>1</sup>Department of Public Health Dentistry, Vidarbha Youth Welfare Society's Dental College and Hospital, Amravati, Maharashtra India

<sup>2,3</sup>Department of Public Health Dentistry, Dr. D.Y. Patil Dental College & Hospital, Dr. D.Y. Patil Vidyapeeth, Pune Maharashtra, India

<sup>4</sup>Department of Public Health Dentistry, Institute of Dental Education and Advance Studies, Gwalior, Madhya Pradesh India

<sup>5</sup>Department of Public Health Dentistry, Shri. Yashwantrao Chavan Memorial Medical & Rural Development Foundation's Dental College & Hospital, Ahmednagar, Maharashtra, India

<sup>6</sup>Department of Public Health Dentistry, Panineeya Institute of Dental Sciences & Research Centre, Hyderabad, Telangana India

**Corresponding Author:** Roshani M Chawla, Department of Public Health Dentistry Vidarbha Youth Welfare Society's Dental College and Hospital, Amravati, Maharashtra, India, Phone: +919860321216, e-mail: roshanichawla@gmail.com

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## INTRODUCTION

Pregnancy is a natural process that may create some changes in different parts of the body including the oral cavity. These changes will lead to oral diseases if enough and timely care of oral cavity is not taken. Women may experience increased gingivitis or pregnancy gingivitis beginning in the second or third month of pregnancy that increases in severity throughout the duration of pregnancy.<sup>1</sup> Pregnancy-associated immunologic changes, particularly suppression of some neutrophil functions, are the probable explanation for the exacerbation of plaque-induced gingival inflammation during pregnancy. Oral health screening is not a routine procedure in many antenatal clinics, and there are no standard guidelines which ensure that all pregnant women are routinely screened, treated, or referred to specialized dental professionals as part of prenatal care.<sup>2</sup> The pregnant women are referred to dentists by obstetricians only when there are complaints by a pregnant woman in relation to oral health.<sup>3</sup>

Prevention of oral and dental problems and their complications in pregnancy period is possible through change in knowledge, attitude, and practice of women by providing oral health education.<sup>1</sup> Thomas et al<sup>4</sup> reported that there was a significant association between dental knowledge and practices with both education and socioeconomic status. Women with less education and lower socioeconomic status were more likely to be at higher risk of poor periodontal health compared with women with greater levels of education and higher socioeconomic status. They also concluded that further study is needed to find whether more intensive dental health education in pregnancy can lead to improved oral health and ultimately improved pregnancy outcomes.

Preventive programs for pregnant women should be designed based on a thorough interview, including an informative session on the specific risks during this period, to motivate the patients toward oral health, and implement the needed prophylactic measures. Improving oral health of women during pregnancy will help improve the oral health of their children. Hence, a longitudinal study was planned to observe the effect of oral health education during pregnancy on knowledge, attitude, practice, oral health status, and treatment needs (TNs) of pregnant women belonging to different socioeconomic groups in Pune district.

## MATERIALS AND METHODS

A longitudinal study was conducted among 112 pregnant women belonging to different socioeconomic groups to assess the effect of oral health education on knowledge, attitude, practice, oral health status, and TNs. The demographic details, knowledge, attitude, and practice of pregnant women, and oral health status [oral mucosal status and condition, periodontal status using Community Periodontal Index of Treatment Needs (CPITN) index, decayed, missing, and filled teeth (DMFT) from dentition status and TN, and prosthetic status and need] were collected through a predesigned questionnaire by a principal investigator through an interview. Oral health examination was carried out to assess oral health status using revised World Health Organization (WHO) Proforma 1997, and oral health education was given through PowerPoint presentation to the participants in local language, i.e., Marathi, after collecting the baseline data. The oral health program focused on the prevention of dental caries and periodontitis through oral hygiene practices and diet counseling and blanket referral.<sup>1</sup> Reinforcement of oral health education and blanket referral was also done at 14th week, and follow-up data were collected at 28th week of gestation.

Before commencing the study, approval was obtained from the Institutional Review Board and Ethical Committee. Permission was obtained from respective medical hospitals to conduct the study. Written informed consent was obtained from each participant. High-risk pregnant women and pregnant women above 6th week of gestation were excluded from the study.

Training and calibration of the examiner for conducting oral examination and also for using revised WHO Oral Health Assessment form (1997) were performed in the Department of Public Health Dentistry. Measurement of agreement for intraexaminer reliability for revised WHO Oral Health Assessment form (1997) for duplicate examination was conducted during the course of study on 12 participants at 1 week interval, which was found to be 0.9 for oral mucosa condition, periodontal status using CPITN index, DMFT from dentition status and TN, and prosthetic status and need. Face and content validity of questionnaire was done among 15 subject matter experts before commencing the study. Reliability of the questionnaire was checked using WINPEPI software. Kappa value was found to be 0.81.

According to a previous study<sup>5</sup> on whether prenatal dental public health makes a difference, mean and standard deviation for plaque scores at visit 1 was  $4.83 \pm 3.33$  prenatally and mean and standard deviation at visit 2 was  $1.44 \pm 2.81$  prenatally. Sample size was calculated as 33; approximately 40 participants were taken in each group

to adjust for the dropouts. Sample size obtained was 120 considering the power of 99% and alpha error of 0.1%. Consecutive sampling technique was used. Data were analyzed using Statistical Package for the Social Sciences software version 17. The demographic details, such as age, sex, education, occupation, income, and the questions based on knowledge, attitude, and practice among participants were analyzed using number, percentage, and mean.

## RESULTS

A total of 120 pregnant women were recruited in the present study and they were followed up for 7 months, out of which, 2 had a miscarriage and 6 were lost to follow-up. A total of 112 pregnant women participated in the present study from different socioeconomic groups. In the present study, 40 participants were in high (H) socioeconomic group and 36 participants were in middle (M) and low (L) socioeconomic group each. Mean age of the study participants was 26.71. All the participants were having normal oral mucosal condition.

At baseline, only 6.25% of pregnant women had healthy periodontal tissue. Most of the women who

were having healthy periodontal tissue were from high socioeconomic class (H = 15%, M = 2.77%, L = 0). After oral health education and blanket referral at 28th week of gestation, periodontal status improved in all pregnant women belonging to different socioeconomic groups as compared with baseline (from 6.25 to 18.75%). Periodontal health after the intervention improved more in pregnant women belonging to high socioeconomic group (Table 1).

Only 6.25% of the participants did not require any kind of periodontal treatment at baseline, and most of them were from high socioeconomic class. At baseline, 93.73% required TN1 and 41.06% required TN2. At 28th week of gestation, this TN2 reduced in all the socioeconomic groups, but the reduction was highest in pregnant women belonging to high socioeconomic group (Table 2). Dental caries was recorded among the study participants using the DMFT index. There was negligible change in the mean DMFT index (0.03) and missing teeth (0) from baseline to 28th week of gestation. The mean number of decayed teeth (0.12) decreased and filled teeth (FT) increased (0.13) at 28th week of gestation. Intensive oral health education and blanket referral motivated few participants to get their decayed teeth filled, which was seen more in high socioeconomic class (Table 3).

**Table 1:** Percentage of participants at baseline (2nd week to 6th week) (pre) and at 28th week of gestation (post)

Socioeconomic groups	Healthy periodontal tissues (H) %		Bleeding (B) %		Calculus (C) %		Shallow pockets 4-5 mm (P <sub>1</sub> ) %		Deep pockets 3-6 mm (P <sub>2</sub> ) %	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
	High (n = 40)	15	37.5	52.5	40	7.5	22.5	25	0	0
Middle (n = 36)	2.77	13.88	44.44	47.22	16.66	25	36.11	13.88	0	0
Low (n = 36)	0	2.77	61.11	61.11	11.11	16.66	27.77	19.44	0	0
Total (n = 112)	6.25	18.75	52.67	49.1	11.60	21.42	29.46	10.71	0	0

**Table 2:** Percentage of participants requiring different treatment needs at baseline (pre) and at the end of 28th week of gestation (post)

Socioeconomic groups	TN1 (%)			TN2 (%)			TN3 (%)		
	Pre	Post	Change	Pre	Post	Change	Pre	Post	Change
High	85	62.5	22.5	32.5	22.5	10	0	0	0
Middle	97.21	86.1	11.11	52.77	38.8	13.97	0	0	0
Low	99.99	97.21	2.78	38.88	36.1	2.78	0	0	0
Total	93.73	81.23	12.5	41.06	32.13	8.93	0	0	0

TN0: No treatment needed; TN1: Oral hygiene needs improvement; TN2: Oral hygiene needs improvement + professional scaling; TN3: Oral hygiene needs improvement + professional scaling + complex treatment<sup>6</sup>

**Table 3:** Knowledge of the study participants regarding oral health care during pregnancy at baseline (pre) and at the end of 28th week of gestation (post)

Socioeconomic groups	FT (n = FT)					
	Pre %	Mean (No)	Post %	Mean (No)	Change %	Mean (No)
High (n = 40)	0	0	17.5	0.18 (7)	17.5	0.18 (7)
Middle (n = 36)	0	0	11.1	0.11 (4)	11.1	0.11 (4)
Low (n = 36)	0	0	8.3	0.08 (3)	8.3	0.08 (3)
Total (n = 112)	0	0	12.5	0.13 (14)	12.5	0.13 (14)

**Table 4:** Knowledge of the study participants regarding oral health care during pregnancy at baseline (pre) and at the end of 28th week of gestation (post)

Questions	High	High	Middle	Middle	Low	Low	Total	Total
	(%) pre (n = 40)	(%) post (n = 40)	(%) pre (n = 36)	(%) post (n = 36)	(%) pre (n = 36)	(%) post (n = 36)	(%) pre (n = 112)	(%) post (n = 112)
1 Do pregnant women have bleeding gums?	7.5	100	2.8	100	2.8	100	4.5	100
2 What is the cause of bleeding gums?	2.5	80	0	52.2	0	66.7	0.9	100
3 Does sweet food cause decay?	85	100	91.7	100	83.3	100	86.6	100
4 What is the cause of dental caries?	25	45	30.6	47.2	22.2	38.9	25.9	100
5 Does fluoridated toothpaste prevent dental caries?	60	100	44.4	100	47.2	100	50.9	100
6 Do you know about fluoridated toothpaste?	57.5	100	41.7	100	38.9	100	46.4	100
7 Can dental X-rays be taken?	75	100	69.4	100	44.4	100	63.4	100
8 Medications prescribed by the dentist should not be avoided	5	100	2.8	100	5.6	100	4.5	100
9 Do oral health problems in the mother affect the baby's health?	67.5	100	69.4	100	58.3	100	65.2	100
10 Is it safe to undergo dental treatment?	95	100	94.4	100	94.4	100	94.6	100
11 Is 2nd trimester safest to undergo dental treatment?	5	100	0	100	0	100	1.8	100
12 Does mother's nutrition have a role in baby's oral health?	75	100	77.8	100	63.9	100	72.3	100
13 Can malaligned teeth lead to poor oral hygiene?	95	100	100	100	97.2	100	97.3	100
14 Can certain medicines taken during pregnancy cause staining of teeth?	0	100	0	100	0	100	0	100

When knowledge regarding oral health care during pregnancy was compared between different social classes, it was found that most of the women from high socioeconomic class gave correct answers to the questions as compared with women of middle- and low-socioeconomic status at baseline. After receiving intensive oral health education at 28th week of gestation, it was found that knowledge regarding oral health care among all the study participants had improved drastically. All the participants answered all the questions correctly (100%) at 28th week of gestation (Table 4).

At baseline, all pregnant women had positive attitude about oral health care during pregnancy. At 28th week of gestation, it was found that attitude regarding oral health care among all the study participants became more positive

(Table 5). At baseline, 92.9% consumed sugar-containing foodstuff during pregnancy. Only 6.3% of the pregnant women brushed their teeth twice a day and only 11.6% visited a dentist every 6 months. At 28th week of gestation, practices, such as brushing teeth twice a day changed only among women of high socioeconomic class (H = 82.5%, M = 27.8%, L = 19.4%) However, negligible change was seen in the frequency of consumption of sugar-containing foodstuff or use of other oral hygiene aids during pregnancy in all socioeconomic groups. This showed that few practices regarding oral health care improved in all socioeconomic groups and practice of frequency of brushing changed only among participants of high socioeconomic class. However, dietary habits related to sugar consumption did not change much in any of the social classes (Table 6).

**Table 5:** Attitude of the study participants regarding oral health care during pregnancy at baseline (pre) and at the end of 28th week of gestation (post)

Questions	High (%) (n = 40)		Middle (%) (n = 36)		Low (%) (n = 36)		Total (%) (n = 40)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1 Is it important to take care of oral health?	80	100	83.4	100	77.7	100	80.3	100
2 Does poor oral health contribute to complications during pregnancy?	67.5	100	66.7	100	63.9	100	66	100
3 Should one visit the dentist during pregnancy?	97.5	100	88.9	100	100	100	95.5	100
4 Is it important to limit frequent consumption of sugary foods and snacking?	87.5	100	88.9	100	91.7	100	89.3	100
5 Is it important to take proper care of the teeth to prevent dental problems?	100	100	100	100	100	100	100	100
6 Is brushing once a day insufficient?	5	95	11.1	27.8	5.6	13.9	7.1	47.3
7 Rated their oral health as good	37.5	100	16.7	100	25	100	26.8	100

**Table 6:** Practice of the study participants regarding oral health care during pregnancy at baseline (pre) and at the end of 28th week of gestation (post)

Questions	High (%) (n = 40)		Middle (%) (n = 36)		Low (%) (n = 36)		Total (%) (n = 40)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1 Consumed sugar-containing foodstuff	85	82.5	94.4	97.2	100	100	92.9	92.9
2 Used toothbrush and toothpaste	100	100	100	100	100	100	100	100
3 Use of other oral hygiene aids	0	0	0	0	0	0	0	0
4 Brushed teeth for more than 5 minutes	35	65	47.2	50	50	55.6	43.83	57.1
5 Use of soft toothbrush	87.5	100	80.5	100	88.9	97.2	85.7	99.1
6 Horizontal and vertical method for brushing	65	77.5	25	72.2	50	80.6	47.3	76.8
7 Changed toothbrush every 4 months	20	80	11.1	50	25	33.3	18.8	100
8 Brushed twice a day	7.5	82.5	2.8	27.8	8.3	19.4	6.3	44.6
9 Use of fluoridated mouthwash in morning sickness	0	27.5	0	13.9	0	5.6	0	16.1
10 Visited the dentist every 6 months	17.5	65	13.9	50	7.7	58.3	11.6	58

## DISCUSSION

Pregnancy is an important milestone in the life course of a female, with the dual factors of pregnancy affecting oral health and oral health affecting the pregnancy outcome.<sup>6</sup> Nevertheless, screening and dental referral is often overlooked in India.<sup>7</sup> Patients, physicians, and dentists are cautious, often avoiding treatment of oral health issues during pregnancy in India.

In the present study, it was found that 93.75% of pregnant women had gingival or periodontal problems at baseline (Table 1). Moreover, these problems were found more in pregnant women belonging to low socioeconomic status. Similar results were also seen in the study conducted by Karunachandra et al<sup>8</sup> in Sri Lanka; there they found that 92.5% of pregnant women had gingival or periodontal problems in urban area. Results of the study conducted by Pentapati et al,<sup>9</sup> Merglova et al,<sup>10</sup> Piscocya et al,<sup>11</sup> and Dhaliwal et al<sup>12</sup> also showed that gingival bleeding and periodontal pockets were significant problems reported by a large section of the expectant mothers. However, in the study conducted by Merglova et al,<sup>10</sup> only 9.8% of the pregnant women had periodontal pockets, whereas in the study conducted by Tilakaratne et al,<sup>13</sup> pregnancy had an effect only on the gingival and not on the periodontal attachment level. In the present study, 29.46% of the pregnant women had periodontal pockets. These variations might be accredited to differences in the study population. Furthermore, in all these studies, it was seen that periodontal health was related to socioeconomic status, which was also seen in the present study. Moreover, this might be due to negligence of oral hygiene by the pregnant women, lack of gynecologists' / midwives' advice to their patients regarding maintenance of good oral hygiene and to have routine dental check-ups during pregnancy, reluctance of dentists to provide dental care to pregnant women due to the fear of risk involved, unaffordability of dental treatment, and other social and cultural factors among pregnant women of

low socioeconomic status, leading to increased gingival inflammation during pregnancy.

In the present study, at baseline, 93.73% required TN1 and 41.06% required TN2. None of the participants required TN3 (Table 2). However, Merglova et al<sup>10</sup> found that 9.8% of the participants required TN3 in their study. At 28th week of gestation, this periodontal TN reduced in all the socioeconomic groups. This showed that intensive oral health education program played an important role in the reduction of periodontal TNs in all socioeconomic groups. However, the reduction in periodontal TN was lowest in pregnant women belonging to low socioeconomic group. This might be because of less utilization of dental services, due to unaffordability of dental treatment, various cultural beliefs, social practices, and misbeliefs associated with pregnancy and oral health.

Dental caries is the second most important disease of the oral cavity in pregnancy. Active dental caries if left untreated can lead to local as well as systemic complications. Therefore, prevention of dental caries is important in pregnant women. The presence of dental caries during pregnancy, especially after birth, represents an increased risk of early childhood caries development. Cariogenic bacteria can be transmitted through the saliva to the oral cavity of infant. In the present study, prevalence of dental caries at baseline among the study participants was 54.4%, and the mean DMFT was 0.65 and no filled teeth were seen (Table 3). However, in the study conducted by Karunachandra et al<sup>8</sup> in Sri Lanka, the prevalence of dental caries in pregnant women was 81.3% and the mean DMFT was also high, i.e., 3.69. Similarly, in a study conducted by Pentapati et al,<sup>9</sup> the prevalence of dental caries was found to be 84% and mean DMFT was 4.08. Merglova et al<sup>10</sup> found the prevalence of dental caries to be 41.3% with a high mean DMFT of 11.5 in their study. However, in these studies, no explanation was given about such high prevalence of dental caries among pregnant women. This difference might also be due to differences in oral hygiene

practices and dietary habits among the study population. In the present study, very few participants got their teeth restored (Table 3). Reasons probably could be that the sociocultural factors had a strong influence to play.

Prevention of oral and dental problems or complications during pregnancy period is possible through appropriate knowledge and attitude of pregnant women. Hence, in the present study, oral health education was given to all the pregnant women to improve the knowledge regarding oral health care, which will ultimately help in maintaining general health of mother and infant. In the present study, at baseline, most pregnant women had limited knowledge about oral health care during pregnancy. Similar results were observed in studies conducted by Hajikazemi et al<sup>1</sup> and Bamanikar and Kee,<sup>14</sup> in which it was found that knowledge related to dental care was poor among pregnant women. From the present study, it was also found that knowledge about oral health care was better in high socioeconomic group when compared with middle- and low socioeconomic classes. This might be because pregnant women belonging to high socioeconomic group were highly educated. Moreover, socioeconomic status is related to educational level, which might explain the reason (Table 4).

In the present study, after intervention at 28th week of gestation, it was found that knowledge regarding oral health care among all the study participants had improved drastically. This showed that intensive oral health education played an important role in the improvement of knowledge among all the pregnant women belonging to different socioeconomic groups. Similar results were seen by Lin et al<sup>5</sup> in their study conducted in Canada. Improvement in knowledge was seen in pregnant women who received oral health education through Healthiest Babies Possible program (Table 4).

In the present study, at baseline, all pregnant women had positive attitude about oral health care during pregnancy (Table 5). However, Hajikazemi et al<sup>1</sup> in their study found that 70% of the pregnant women had negative attitude toward oral health care during pregnancy. After intervention at 28th week of gestation, it was found that attitude regarding oral health care among all the study participants became more positive for few questions. This showed that intervention had reinforced the positive attitude among all the pregnant women belonging to different socioeconomic groups.

At baseline, only 11.6% of the women visited dentist for every 6 months and 6.3% of the study participants brushed their teeth twice daily (Table 6). Similar results were seen in the study conducted by Thomas et al<sup>4</sup> in which, although 91% of pregnant women stated they brushed their teeth one or more times a day, around 30% attended the dentist while pregnant. This result was

also substantiated by Hajikazemi et al,<sup>1</sup> Bamanikar and Kee,<sup>14</sup> and Al Habashneh et al<sup>15</sup> in their study. Practice of pregnant women belonging to low socioeconomic group was not good, which might be because of poor knowledge toward oral health, unaffordability of dental treatment, and cultural misbeliefs.

After oral health education at 28th week of gestation, it was found that only some practices regarding oral health care among all the study participants had changed. However, negligible change was seen regarding the use of other oral hygiene aids during pregnancy in all socioeconomic groups. Dietary habits related to sugar consumption did not change much in any of the social classes. This showed that few practices regarding oral health care did not improve in all socioeconomic groups.

The limitation of the study was that the pregnant women were not followed up to assess their pregnancy outcomes as this was beyond the scope of the present study. It was concluded from the present study that intensive oral health education during pregnancy can lead to improvement in knowledge, attitude, and practice of pregnant women. It can also be stated that there is a need for the health care profession to acknowledge the importance of good oral health in ensuring a safe and successful pregnancy and overcome misconceptions regarding rendering of essential dental care during this vital period in a woman's life.

## CONCLUSION

At baseline, knowledge was limited, attitude was positive, while the practice was fair to poor regarding oral health care during pregnancy in pregnant women belonging to different socioeconomic groups. After oral health education and blanket referral, at 28th week of gestation, knowledge regarding oral health care improved drastically, attitude toward oral health became more positive, whereas practice did not change much among all the pregnant women belonging to different socioeconomic groups. Change in practice was least in low socioeconomic group when compared with high and middle socioeconomic groups, probably due to less accessibility, unaffordability of dental treatment, social and cultural factors. Intensive oral health education during pregnancy leads to drastic improvement in knowledge and attitude. Practice, gingival health, and the number of filled teeth also improved to some extent.

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