Investigation on the level of awareness about the correlation between oral health and pregnancy: health education and prevention in the maternal-child context.

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Abstract

It has been estimated that up to 100% of pregnant women may experience oral health problems. Numerous clinical studies have demonstrated the correlation between periodontitis and vaginosis, endometriosis, preeclampsia, gestational diabetes, preterm birth, low birth weight and infertility. The aim of this study was to highlight the degree of knowledge of the correlation between the expressed pathologies of healthcare professionals such as general practitioners, gynecologists, obstetricians, dentists and dental hygienists, with the possibility of proposing preventive interventions effective. The objective was achieved through the administration of two evaluation questionnaires which confirmed the hypothesis that healthcare workers themselves were not sufficiently informed about the bidirectional relationship between oral pathologies and pregnancy.

Introduction

Pregnancy is a physiological process in which each pregnant woman's body prepares to welcome a new organism. It is characterized by vascular, immunological and hormonal changes that occur in order to provide sustenance, nutrition and development of the fetus. During this period, the health of a woman's oral cavity is particularly compromised. Pregnancy involves the formation of an important organ, the placenta, whose main functions are to produce the hormones necessary for its continuation, such as: estrogen, progesterone, placental prolactin and chorionic gonadotropin. These hormones act at the level of the gingival mucosa causing an increase in vascular permeability, crevicular fluid, thickening at the epithelial/submucosal level and an increase in desquamation. A further action is carried out by saliva, in which, starting from the twentieth week of gestational age, steroids of fetoplacental origin are present which alter the subgingival bacterial flora, as they act as growth factors for gram-negative microorganisms. The consequences will therefore be a lowering of the immune defenses in relation to the oral cavity and a greater predisposition to the onset of inflammation of the gingival tissue. In 50% of pregnant women these conditions can cause sialorrhea and ptyalism (i.e. an increase in salivation associated with a lowering of pH, lysozyme and □-globulins with an increase in mucin) and bleeding during brushing of the oral cavity.

In some particular cases there may be hypertrophy of one or more interdental papillae which can take on the appearance of a granuloma (pregnant epulis). The state of oral hygiene of pregnant women worsens with the presence of symptoms such as nausea and vomiting which acidify the oral environment with the development of acidogenic anaerobes (lactobacilli, streptococci, actinomycetes). These phenomena occur due to partial incontinence of the gastro-esophageal sphincter due to compression of the stomach due to the growth of the uterine volume. Sometimes these symptoms can worsen and evolve into hyperemesis gravidarum, a condition that over time determines the demineralization of dental tissues and gingivitis, whereby the resulting erosion of dental enamel favors the development of tooth decay. These phenomena can last for the entire course of pregnancy, exposing the woman to a greater risk of oral pathology.

EFFECTS OF ORAL DISEASES ON THE PROGRESSION AND OUTCOMES OF PREGNANCY

The greater susceptibility of women towards oral pathologies present during pregnancy leads to an increase in the percentage of risk of adverse events which increase the possibility of failure.
Research, especially in recent years, is analyzing how oral cavity pathologies can be the cause of the onset

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of conditions that put the health of women and/or children at risk.
The placenta is an organ that allows the connection between the maternal and fetal compartments.
Among its many functions, the placenta has the task of acting as a protective barrier to prevent the passage of pathogens
Despite this, there are harmful substances that have the ability to penetrate the placental barrier causing inflammatory or infectious processes; among these are the endotoxins of periodontal Gram-negative bacteria which, crossing the placenta, can influence the development of the fetus, while the overproduction of pro-inflammatory cytokines generated within the diseased periodontal tissue can enter the systemic circulation and precipitate.
These substances will be present in high concentrations within the amniotic fluid (physiologically sterile substance that protects the fetus),
therefore the presence of an infection (of any type) activates the inflammatory process affecting the amniotic fluid, resulting in an increase in physical stress which can lead to early labor.
If this process occurs during the first trimester, a period in which the embryo is developing and organogenesis begins, it can cause spontaneous abortion in 1% of cases.

PREECLAMPSIA
Periodontal disease can cause preeclampsia from the moment in which the infectious process that settles in the oral cavity expands to the blood circulation level.
Preeclampsia is a multi-system syndrome consisting of generalized vasoconstriction and the presence of peripheral vascular lesions in the kidneys, liver, lungs, brain and uteroplacental compartment.
In particular, the damage that occurs in the placental area and in the blood vessels that supply it alters maternal-fetal exchanges, compromising the well-being and correct fetal development.
Preeclampsia is a pathology that appears around the twentieth week and manifests itself through:
• hypertension: BP > 140/90 mmHg
• proteinuria: >0.3g/24h
• other symptoms: visual disturbances, headache, edema, excessive weight gain, etc.
If not treated correctly, preeclampsia can quickly evolve into eclampsia, i.e. a condition characterized by the symptoms listed above in addition to convulsions with cerebral ischemia which are responsible for serious consequences for both the mother and the fetus.
In this regard, we can understand how important it is to maintain correct oral hygiene before, during and after pregnancy.

PREVENTION OF ORAL HEALTH
The prevention and promotion of oral health is achieved by acting on various aspects.

ORAL HYGIENE
The aim of carrying out home oral hygiene methods is the elimination of bacterial biofilm from the oral cavity by mechanical and chemical means.
- Mechanical means: the main mechanical tool for removing plaque is the toothbrush, which can be manual or electric. The first must have specific characteristics, such as synthetic bristles, of medium hardness and with a rounded tip and finally a length of the head and handle suitable for the age and size of the patient's mouth.
- . Just using the toothbrush is not enough, it must be combined with interdental hygiene aids, such as floss and brush.
- Chemical means:
 Toothpaste is a paste with a slightly abrasive, detergent and vehicle action for pharmacologically active substances.
 It is a product that conveys active ingredients through brushing, including antibacterial substances (triclosan, chlorhexidine, cetylpyridinium chloride), desensitizing (amino fluoride), remineralising (stannous fluoride, calcium, phosphates).
 Mouthwash is an antiseptic and anti-plaque that helps prevent cavities, gingivitis and bad breath, but does not eliminate the need for brushing and flossing. Common use is to rinse your mouth with about 20 ml of mouthwash twice a day after brushing, for about half a minute.
 It is advisable to use mouthwashes at least one hour after brushing with toothpaste, when the latter contains sodium lauryl sulfate, as the anionic SLS compounds present in the toothpaste can deactivate the cationic agents present in the mouthwash.

A. FOOD PROPHYLAXIS
From the point of view of tooth decay, we have already established the negative role of fermentable carbohydrates and in particular of monosaccharides and disaccharides.
It is therefore necessary to regulate its intake.
It is possible to replace sugars with xylitol, which is instead a sugar capable of carrying out an important cario-preventive activity by reducing the concentration of S. Mutans and therefore the levels of acid produced.
Nutrition plays an important role, not only in dental caries, but also in periodontal disease; in fact, an incorrect diet negatively affects the onset of the pathology.
Risk prevention is achieved, also in this case, through a balanced diet, low in sugar, but also high in fiber and omega-6-omega-3 fatty acids.
The role of micronutrients, such as vitamin D, E, K and magnesium, is still to be clarified, while vitamin A, B, C, calcium, zinc and polyphenols are excellent preventive elements. Regarding probiotics, they seem to promote periodontal health, but further investigations need to be carried out.

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B. CONTROL OF PREGNANCY HYPEREMESIS

To counter the risk of erosion and tooth decay in pregnant women who often experience nausea and vomiting due to hyperemesis gravidarum, there are pharmacological and non-pharmacological treatments that can help.

The effectiveness of ginger in the form of capsules or syrup as the main non-pharmacological treatment has been demonstrated in several studies.

Further studies indicate an improvement in symptoms in women who change their eating habits, eating small but frequent meals and avoiding strong-smelling foods.

Furthermore, a series of recommendations may be useful, such as: rinsing the mouth with a teaspoon of sodium bicarbonate dissolved in water following episodes of vomiting, chewing gum without sugar or with xylitol after meals and finally using a delicate toothbrush with a non-abrasive fluoride toothpaste.

C. DENTAL CHECK-UP VISITS

Dental check-ups every 4-6 months allow for the early identification and treatment of any pathological processes affecting the teeth and gums.

Also appropriate are professional oral hygiene sessions to remove plaque and tartar that accumulate in areas where home hygiene is more difficult.

The administration of fluoride supplements during pregnancy is not recommended as there is a lack of clear scientific evidence, it is possible, instead, to recommend vitamin and/or mineral supplementation.

A reduced level of vitamin D during pregnancy could cause inadequate development of ameloblasts; a recent study highlights the presence of an inverse relationship between vitamin D levels and the onset of tooth decay in the first year of life; however, further investigation needs to be conducted in this regard.

Supplementation with 400 mcg of folic acid per day is currently recommended for all women who do not rule out pregnancy, for the prevention of neural tube defects.

There is still no definitive evidence on its potential role also for reducing the risk of other congenital anomalies such as cleft lip and palate, nevertheless, an increased risk of cleft lip and palate has been found in women who follow a "Western" dietary pattern, i.e. with reduced intake of fruit and vegetables, main sources of folate.

THE TASK OF HEALTH PROFESSIONALS

Prevention and treatment of gingivitis, periodontitis and dental caries before, during and after pregnancy can improve the oral health of pregnant women and newborns. There is currently no substantial scientific evidence to demonstrate that periodontal therapy during pregnancy can reduce the risk of adverse outcomes, however, performing dental treatment in the pregnant woman does not lead to an increased risk of complications as the systemic spread of microbes oral pathogens during a professional oral hygiene session does not constitute a potential danger.

On the contrary, postponing the treatment of serious oral infections can cause systemic spread of pathogenic bacteria or progression of the infection to systemic involvement with possible strongly negative influence on the good progress of the pregnancy.

To formulate an adequate and correct treatment plan for the pregnant woman, it is necessary to consider: the gestational age of the fetus, any health conditions of the woman and the obstetric risk associated with it (high/low obstetric risk pregnancy) as well as the Physiological changes that occur during pregnancy.

The safest period to perform therapeutic dental procedures during pregnancy is at the beginning of the second trimester, from the fourteenth to the twentieth week of gestation since the risk of interruption is lower than that of the first and third trimesters.

This period is safer since by the twentieth week of gestation the pregnant uterus is below the umbilical-transverse line (OT) and dental procedures can be performed more comfortably on the dental chair.

The increased risk is linked to the fact that in the first trimester the organogenesis is not completed as well as in the third trimester, the enlarged uterus can compress the inferior vena cava and the pelvic veins, hindering the venous return to the heart causing a decrease the amount of oxygen delivered to the brain and uterus.

Therefore, women positioned supine in the dental chair may experience nausea or vomiting or hypotension.

After the twentieth week of gestation, they should be kept in a semi-sitting position or with a pillow placed under the right side of the body to allow the uterus to move laterally to the left of the vena cava. This positioning is generally comfortable and will avoid hypotension, nausea and delayed gastric emptying.

Pregnancy, therefore, does not constitute a contraindication for dental therapy and it is, indeed, preferable to provide complete oral hygiene during this period.

If dental x-rays are needed, it is advisable to protect the maternal abdomen with a lead apron. If there is a need to carry out local anesthesia (lidocaine), this is harmless to the mother and fetus.

If there is a need to administer antibiotic therapy, it is possible to use drugs such as: spiramycin, amoxicillin, cephalosporins or penicillin, if there is no intolerance towards the latter.

Health workers have the duty to expand knowledge regarding the problems previously treated, to transmit the right information in this regard and to

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promote more correct behaviors that women must adopt for preventive purposes.
In this regard, the recommendations for the promotion of oral health that the Ministry of Health has drawn up are reported:

"The main measures that the doctor, dentist, paediatrician, obstetrician, gynecologist, dental hygienist should suggest, promote and adopt are:
1. Oral health education.
2. Teaching and personal oral hygiene techniques.
3. Nutrition education aimed at preventing tooth decay in the unborn child.
4. Evaluation of oral conditions.
5. Performing a professional oral hygiene procedure during pregnancy.
6. Evaluation of the child's oral cavity by the pediatrician within the 12th and 24th month of life."

Furthermore, the Ministry of Health has published a home oral hygiene protocol that every professional involved in perinatal care must explain and advise to the pregnant woman to prevent the onset of oral pathologies. Below are the key points:
- Brush your teeth after each meal for 2-3 minutes with a toothbrush with a small-medium head and medium-hard artificial bristles.
- Brush all tooth surfaces (replace the toothbrush every two/three months).
- Eliminate plaque in the interproximal spaces using dental floss.
- Preferably use a fluoride toothpaste.

OBSERVATIONAL STUDY

The present study was created with the aim of satisfying the need for further investigations regarding the correlation between oral health and pregnancy, to highlight the need to promote teamwork among the health workers involved and to make women more aware of what the more correct behaviors for oral health
Additionally, women's habits and beliefs regarding their children's oral health were assessed.
The study was carried out in the low- and high-risk pregnancy wards and in the outpatient clinics of the U.O.C. of Gynecology and Obstetrics of the AOU Federico II of Naples.
- Phase I: the patient was invited to read and sign the informed consent, which indicated the characteristics and methods of carrying out the study
- Phase II: the patient was subjected to an anonymous evaluation questionnaire followed by an interview in which prevention and health education activities were carried out.
- Phase III: at the end of the interview the patient was given a second questionnaire with the aim of understanding whether the interviewee considered information on oral health necessary.

QUESTIONNAIRE 1

Age: _____
Weeks of gestation: _____
No. of pregnancies (specify outcome): _____

1. Since your pregnancy began, have you ever been advised to have a visit to the dental hygienist?
   Yes
   No

2. If yes, by which professional figure?
   Gynecologist/obstetrician
   General practitioner
   Dentist

3. Are you afraid of professional oral hygiene sessions during pregnancy?
   Yes
   No

4. Are you aware that pregnancy can cause changes to your teeth and gums?
   Yes
   No

5. Since your pregnancy began, have you ever been given instructions on home oral hygiene methods?
   Yes
   No

6. During the day, how often do you brush your teeth?
   Once
   Twice
   After every meal

7. How long after meals do you brush your teeth?
   - Immediately after meals
   - After 10 minutes after meals
   - After 30 minutes after meals

8. Which devices do you use? (can indicate more than one)
   - Manual toothbrush
   - Electric toothbrush
   - Toothpaste
   - Mouthwash
   - Dental floss
   - Pipe cleaner
   - Water flosser
   - Single tufted toothbrush

9. Have you ever noticed bleeding gums while brushing?
   - Always
   - Some time
   - Never

10. If yes, how did you react?
   - She didn't do anything
   - She used mouthwash
   - She informed her GP
   - She informed her gynecologist/obstetrician
   - Notified your dentist/hygienist

11. Are you aware that correct oral hygiene during pregnancy can reduce the risk of adverse pregnancy events (abortion, preterm birth, preeclampsia)?
   - Yes
   - No

12. In your opinion, does the risk of tooth decay in the child increase if the mother has the same pathology?
   - Yes
   - No

13. Have you ever been advised to take fluoride (in the form of tablets or drops) during pregnancy?
   - Yes
   - No

14. If yes, who prescribed it to you?
   - Dentist/hygienist
   - Gynecologist/midwife
   - General practitioner

15. As far as the child is concerned, how important do you think the care of milk teeth is?
   - Not much
   - Enough
   - Very

16. Which form of breastfeeding do you think is best?
   - Breastfeeding
   - Artificial feeding (bottle feeding)
   - There is no difference

17. Are you familiar with “baby bottle syndrome”?
   - Yes
   - No

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18. In your opinion, does the shape of the pacifier affect the structure of the oral cavity?
Yes
No

19. In your opinion, what are the most risky foods for the onset of tooth decay in children?
Fats
Sugars
Proteins
Fibers

20. In your opinion, at what age should you start brushing your child's teeth?
After weaning (4-6 months)
From the eruption of the first baby tooth (6 months)
In the first year of kindergarten (3 years)
From the eruption of the first permanent tooth (6 years)

QUESTIONNAIRE 2

1. Have you ever received this information before today?
Yes
No

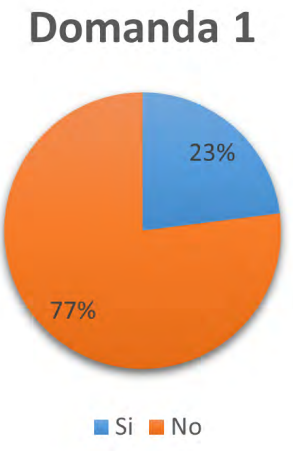
2. Do you think it is necessary to discuss these topics during pregnancy?
Yes
No

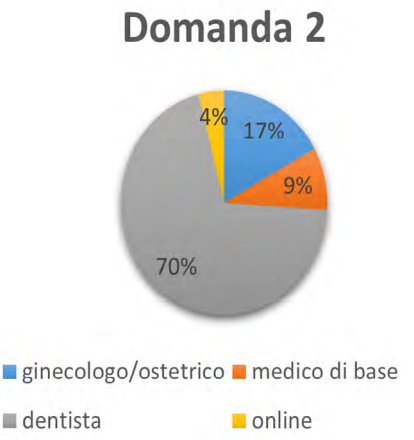
3. In particular, do you think it is useful to treat them in a birth training course?
Yes
No

4. Do you think it is useful to consult a dental hygienist during pregnancy?
Yes
No

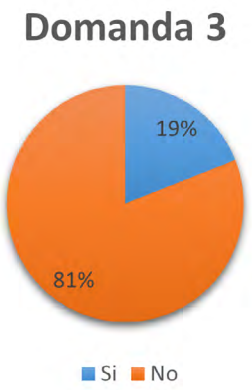
A. STATISTICAL DATA ANALYSIS

We reached a sample size of 100 units and from the questionnaires it emerged that:

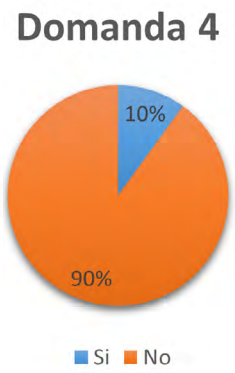




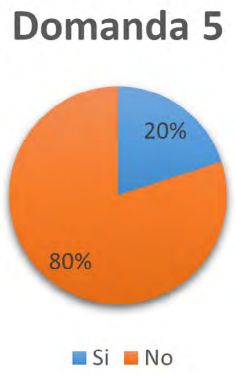
- Only 23% of the pregnant women subjected to the study were advised to undergo a visit to the dental hygienist during pregnancy: of which approximately 70% were advised by a dentist, approximately 17% were advised by a gynaecologist/obstetrician, the 9% recommended by a general practitioner and finally 4% say they have informed themselves online.

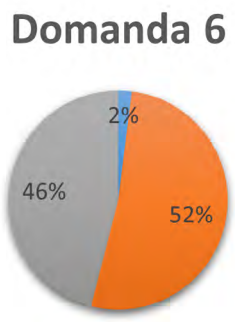


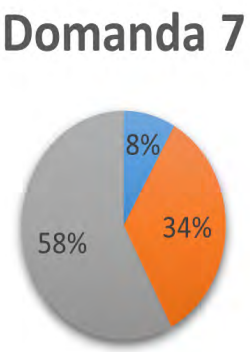
- 19% of the pregnant women subjected to the study are afraid of having professional oral hygiene sessions during their pregnancy.

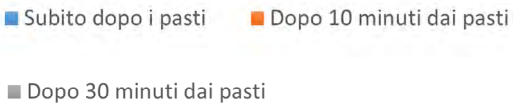


- 10% of the pregnant women subjected to the study are not aware that the state of pregnancy can cause alterations to the teeth and gums.



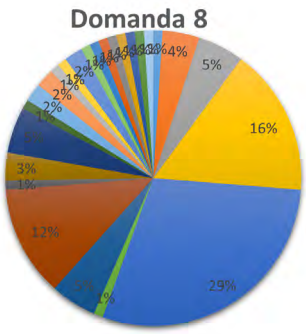






Dopo 30 minuti dai pasti

- 80% of pregnant women have never been given instructions on home oral hygiene methods.
- Particularly relevant data considering that only 46% of women said they brush their teeth after every meal, while 52% say they brush them twice a day and finally 2% carry out oral hygiene methods once a day.
- Furthermore, 56% of participants say they wait at least thirty minutes before brushing their teeth, 33% at least ten minutes and only 8% immediately after the meal (3% abstained from responding).



- spazzolino elettrico, dentifricio, collutorio e filo interdentale
- spazzolino manuale, dentifricio, collutorio e filo interdentale
- spazzolino elettrico e dentifricio
- spazzolino manuale, dentifricio e collutorio
- spazzolino manuale e dentifricio
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- spazzolino elettrico, dentifricio e collutorio
- spazzolino manuale
- spazzolino elettrico, dentifricio, collutorio, filo interdentale e idropulsore
- spazzolino elettrico
- spazzolino manuale, dentifricio e filo interdentale
- spazzolino elettrico, dentifricio, colluttorio, filo interdentale e scovolino
- spazzolino manuale, spazzolino elettrico e dentifricio

To the question: "which devices do you use? (can indicate more than one)" the patients responded:

- 1% electric toothbrush, toothpaste, mouthwash and dental floss;
- 4% manual toothbrush, toothpaste, mouthwash and dental floss;

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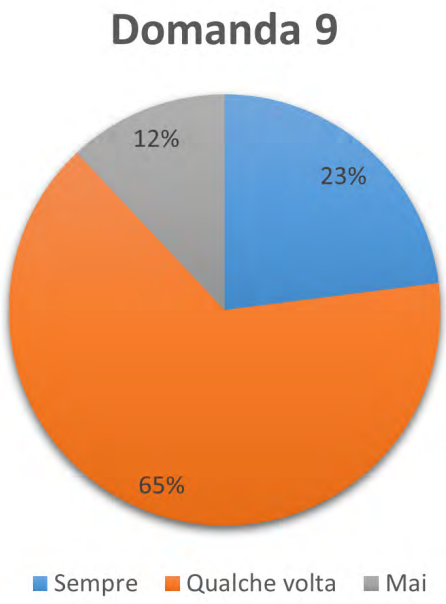
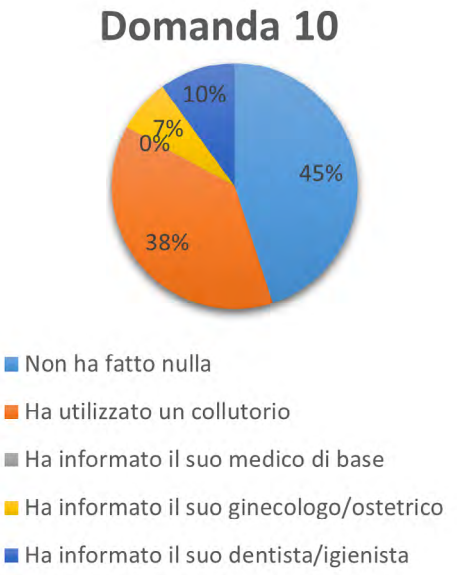
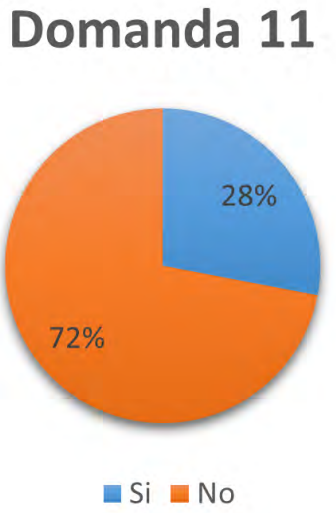
- 5% electric toothbrush and toothpaste;
- 16% manual toothbrush, toothpaste and mouthwash;
- 29% manual toothbrush and toothpaste;
- 1% electric toothbrush, toothpaste and dental floss;
- 5% electric toothbrush, toothpaste and mouthwash;
- 12% manual toothbrush;
- 1% electric toothbrush, toothpaste, mouthwash, dental floss and water flosser;
- 3% electric toothbrush;
- 5% manual toothbrush, toothpaste and dental floss;
- 1% electric toothbrush, toothpaste, mouthwash, dental floss and brush;
- 2% manual toothbrush, electric toothbrush and toothpaste;
- 2% manual toothbrush, electric toothbrush, toothpaste, mouthwash and floss;
- 1% manual toothbrush and electric toothbrush;
- 1% manual toothbrush, electric toothbrush, toothpaste and water flosser;
- 2% manual toothbrush and mouthwash;
- 1% manual toothbrush, toothpaste, dental floss and brush;
- 1% manual toothbrush, toothpaste and water flosser;
- 1% manual toothbrush and dental floss;
- 1% manual toothbrush, electric toothbrush and mouthwash;
- 1% manual toothbrush, electric toothbrush, toothpaste, mouthwash and water flosser;
- 1% manual toothbrush, electric toothbrush, toothpaste and dental floss;
- 1% electric toothbrush, toothpaste, mouthwash and brush;
- • 1% electric toothbrush and mouthwash.

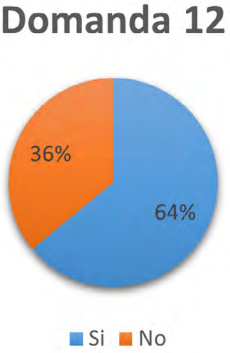




- 23% of women claim to have had bleeding problems for the entire course of their pregnancy, 65% have sometimes encountered the problem: of these, only 10% have turned to their hygienist/dentist, 7% have is addressed to their gynecologist/obstetrician, 38% have used a mouthwash and 45% have done nothing.



- Regarding the question: "Are you aware that correct oral hygiene during pregnancy can reduce the risk of adverse pregnancy events (abortion, preterm birth, preeclampsia)?" only 28% said yes.
Regarding the questions asked about the oral hygiene of the unborn child, it emerged that:



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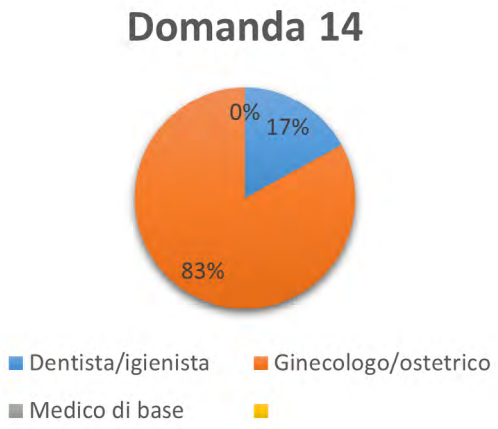
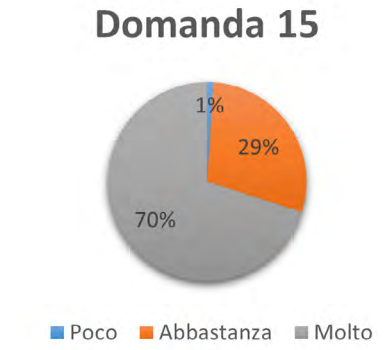
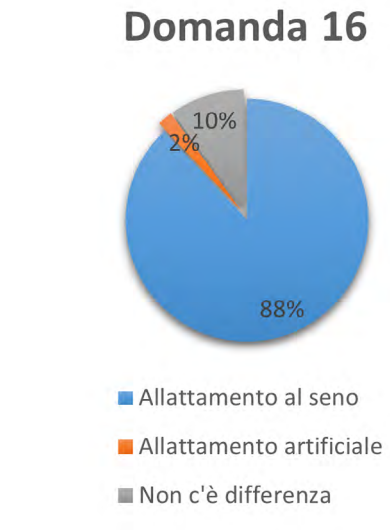
- 64% of women are not aware of the fact that the risk of tooth decay in children increases if the mother is affected.

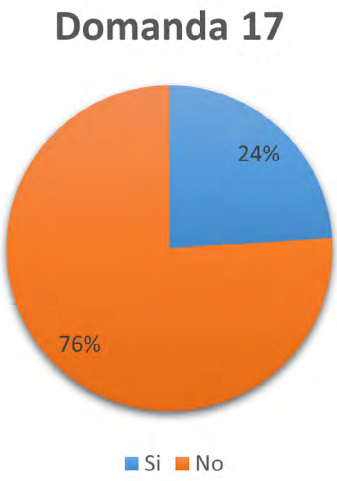


- To the question: "Have you ever been advised to take fluoride (in the form of drops or tablets) during pregnancy?" 93% answered no, 1% abstained from answering; however, 6% answered yes, of which 83% on the recommendation of the gynecologist/obstetrician, 17% on the recommendation of the dentist/hygienist.

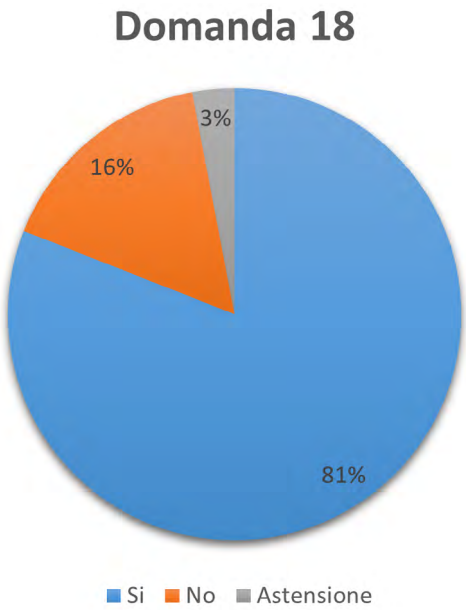


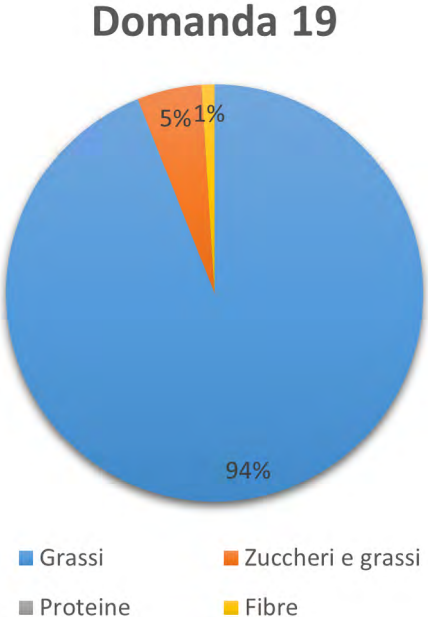
- 70% of pregnant women said they considered the care of deciduous teeth very important, 29% considered it quite important, however, 1% considered it not very important.





- When choosing the best form of breastfeeding, 88% answer breastfeeding, 2% artificial feeding; however, 10% do not believe there is a difference between the two forms of breastfeeding. Furthermore, 76% are unaware of baby bottle syndrome.





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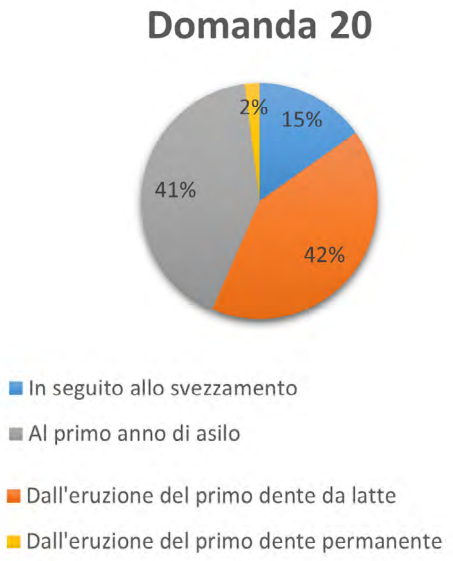
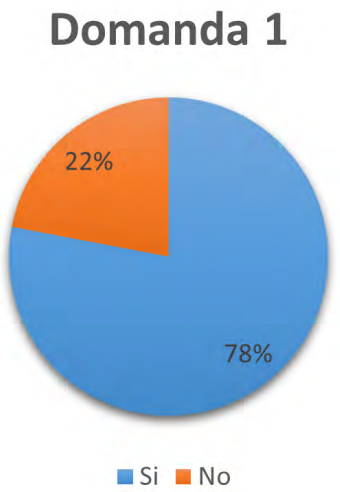
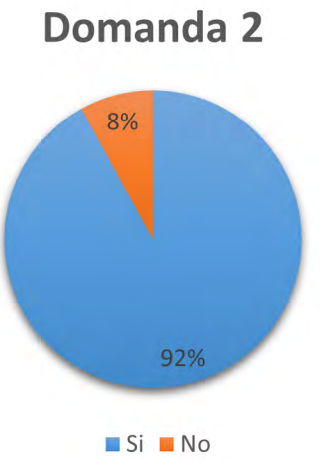
- More reassuring data are available regarding questions 18 and 19 as: 81% of women are aware that the shape of the pacifier affects the development of the oral cavity; instead, 3% of them abstain from responding. 94% of women are aware that sugars are the most risky foods for the onset of tooth decay; instead, 5% consider both sugars and fats responsible and finally 1% associate the risk with fibre.

- When choosing the age to start oral hygiene in children, 15% believe the time of weaning is optimal, 41% believe it should start with the eruption of the first deciduous tooth, the same percentage of participants responds "at first year of kindergarten" and finally 2% upon the eruption of the first permanent tooth.

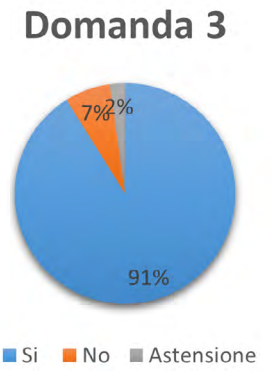


- 78% of pregnant women say they have never had information on these issues, information that 92% consider necessary during pregnancy.

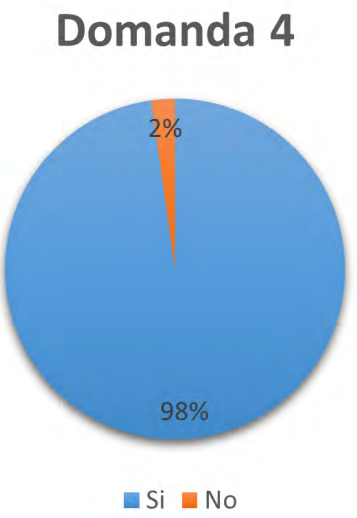




- 82% of women believe that the childbirth training course is a suitable time to discuss these topics; however, 2% abstain from responding.



- 88% of participants believe it is useful to consult a dental hygienist during pregnancy.



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Conclusions

The results highlighted that the patients enrolled have a low level of knowledge about the topics covered.
Even though the level of home oral hygiene is insufficient, pregnant women are reluctant to undergo a professional oral hygiene session during pregnancy as they fear complications for the fetus.
Consequently, the patients declared that they had no knowledge about oral prevention of future unborn children.
In conclusion, it is demonstrated that misinformation on oral health prevention is linked to a failure to transmit information from healthcare professionals to pregnant women, to avoid the onset or progression of risk pathologies.
It is highlighted that oral health assessment and preventive interventions are not yet an integral part of perinatal care.
Preventive perinatal healthcare services should ensure that every pregnant woman receives sufficient information on oral health and it is for this reason that re-education of healthcare personnel would be appropriate as well as the promotion of teamwork among all healthcare workers involved.

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