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MENGUKUR UNSTIMULATED AND STIMULATED PH AND SALIVA FLOW RATE PADA WANITA HAMIL YANG MENGKONSUMSI SIRIH PINANG

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ABSTRAK

Analysis saliva pada wanita hamil yang mengkonsumsi sirih pinang akan menjadi hal yang penting untuk mengevaluasi kondisi saliva . Tujuan dari penelitian ini adalah untuk mengukur unstimulated saliva flow rate dan pH serta stimulated saliva flow rate dan pH pada wanita hamil yang makan sirih pinang di Kabupaten Kupng Nusa Tenggara Timur. Metode , responden 102 wanita hamil yang makan sirih pinang berasal dari 4 desa di 4 kecamatan.. Sampel saliva dikoleksi antara jam 9 – 12 pagi *unstimulated* saliva dan *stimulated* saliva. Setelah dikoleksi air ludahnya maka diukur SFR nya dalam ml/10 menit dan PH nya menggunakan saliva check buffer Kit, GC Corporation, Tokyo ,Japan). Berbasis pada perubahan warna pada indicator kertas strip.Stimulated Saliva diukur dengan cara yang sama setelah mengkonsumsi sirih pinang.. Hasil sebanyak 102 wanita hamil yang makan sirih pinang berpartisipasi dalam penelitian ini. Dilihat dari kelompok umur yang paling banyak adalah berturut turut 21-30 tahun sebanyak 43%,lalu >30 tahun sebanyak 38.7% dan sebanyak 18.3% umur < 20 tahun. Frekuensi yang mengkonsumsi sirih pinang lebih dari 4 kali sehari 43%, 3-4 kali sehari 39.8% dan 1-2 kali sehari 17.2%. sedangkan menyangkut lamanya seseorang makan sirih pinang selama ini sebanyak 55.% antara 11-20 tahun, 1-10 tahun 37.6% dan lebih dari 20 tahun 6.5%. rata rata unstimulated saliva flow rate 8.283/10 menit ($p<0.001$) dan stimulated saliva flow rate 17.969/10 menit ($p<0.001$). rata rata unstimulated pH saliva 6.635 ($p<0.001$) dan rata rata stimulated pH saliva 9.291 ($p<0.001$).

Kata kunci: laju aliran air liur; ph; wanita hamil mengunyah sirih

ASSESSMENT OF PH FLOW RATE AND SALIVA IS NOT HIGHLY AND STIMULATED IN PREGNANT WOMEN WHO CHEW BELT NUT

ABSTRACT

Introduction Salivary analysis in pregnant women chewing betel nut become an important resource for the evaluation of salivary conditions. The aim of the study is to asses the unstimulated Saliva Flow Rate and pH and stimulated Saliva Flow Rate in pregnant women chewing betel nut in Kabupaten kUpang East Nusa tenggara. MethodsRespondents 102 pregnant women who ate betel nut came from 4 villages in 4 sub-districts. Saliva samples were collected between 9 – 12 am unstimulated and stimulated saliva. After collecting the saliva, the SFR was measured in ml/10 minutes and the pH was measured using a saliva check buffer kit, GC Corporation, Tokyo, Japan). Based on the color change on the paper strip indicator. Stimulated Saliva was measured in the same way after consuming betel nut. Result Out of total 102 pregnant women chewing betel quid participated in this study giving a response. Most group of aged who participated for this study in the row, between 21-30 years 43% and then 38.7% aged > 30 years and 18.3% aged < 20 years. Frequency of consumption, more than 4 time a day were the higest prevalence 43% and in the row 3-4 time a day 39.8%, and the last one 1-2 time a day 17.2 %. Regarding duration pregnant women chewing betel quid amongst total betel nut chewing in pregnan women, 55.9% between 11-20 years, 1-10 years 37.6% and more than 20 years 6.5%. Mean unstimulated Saliva Flow rate 8.283 per 10 minutes ($p<0.001$) and Stimulated Saliva Flow Rate 17.969 er 10 minutes ($p<0.001$). Mean Unstimulated pH Saliva 6.635 ($p<0.001$) and Mean Stimulated pH Saliva 9.291 ($p<0.001$).

Keywords: pregnant women chewing betel quid; ph; saliva flow rate

INTRODUCTION

Betel quid chewing is common in Timor Kupang Regency, East Nusa Tenggara. It is the fourth most commonly used drug worldwide after tobacco, alcohol, and caffeine. It is estimated that 10% of the world's population uses betel nut (Gupta, 2002). The perceived benefits of betel nut use include being used as a mouth refresher, laxative, stimulant, an aid for relaxation and coping with stress. There is evidence to show that the frequency of betel nut use is increasing in the Western Pacific Region and that its use is more frequently associated with the chewing of tobacco.

Betel nut chewing induces oral precancerous lesions that have a high propensity to progress. Betel nut itself has been classified as a Group carcinogen (carcinogenic to humans) by the International Agency for Cancer Research (IARC, 2012). While it is clear that the use of betel nut alone is a threat to health, its combination with tobacco greatly increases an individual's risk of premature illness and death. In countries in the Western Pacific Region where this is observed, betel nut and tobacco chewing has become a significant public health problem (Pobutsky ang Enrico Neri (2012)). Use of betel nut and tobacco is the leading preventable cause of death globally, killing up to one half of the people who consume it. Strong social norms also encourage the combination of betel nut and tobacco. The health, social and economic burdens of betel nut and tobacco use in all of its forms are very dangerous.

The betel quid consist of betel nut, betel pepper (leaf or flower) and lime sometime they use tobacco. Usually, the nut is sliced into thin shards, combined with a variety of other ingredients lime, flower pepper betel including tobacco.. This preparation, usually referred to as 'quid' is held in the mouth chewed to extract the juice. There is evidence to show that the frequency of betel nut use is incrising in around the world and its Betel nut chewing induces oral precancerous lesions that have a high propencity to progress. Betel nut chewing has become significant public health problem.Review from Shirzaiy and Neshat (2020) Areca nut product chewing has deleterious effects on oral and dentalhealth. Tooth fracture, periodontal disease, leukoplakia, lichenoid lesions, oral sub-mucous fibrosis (OSF), and oral cancer can be correlated with areca nut use. There-fore, public health proceeding to discontinue areca nut consumption is advised to control premalignant and malignant lesions, such as OSF and oral cancer

This practice is widespread in East Nusa Tenggara . In Kupang Regency In past researchout of total children surveyed,405 boys and girl, about83.8% chewing betel quid. About 89.1 from primary school remote area chewing betel quid.Almost 73% they chewing with betel nut, pepper betel and lime. Children love to chewing at home about 99.8%, describe that the parent let them to cewing betel quid. The children love eat fresh betel nut than the dried slices one (67.6%). The majority of the users (75,15%) were unware of harmful effect of betel quid use and few were aware that it may cause health problems. Mostly children never heard about how dangerous betel nut for health.(Ngadilah, 2015)

In Timor especially Kabupaten Kupang people believe that betel nut chewing have highly valued for its psychoactive properties in reducing tention, producing euphoria or a sense of well being, incrising the capacity to work and providing the means of social interactions , warm sensation, heightened alertness, combat against hunger and incriessed stamina, some people still use the betel nut to religy. Not just for women, man also use the betel nut for beauty. This is because the red colour from the betel quid juice make the lips red so make people look beautiful and not look pale.

Betel nuts has been linked closely to poverty. During the pandemic of COVID 19 era, many prices has gone up, especiallybasic daily needs such as food and vegetables.Even so, what is even more devastating is that the daily wages from the private sector tends to stay the same like before the pandemic. This situation has also created many jobless community and many new family falls in the category of poverty. Moreover, the prices of betel nuts has also gone up significantly, but surprisingly does not prevent betel nut consumers to buy them daily. The community in this region (especially in the districts) tend to spend more money on betel nuts amongst other daily needs.

Chewing betel quid is common everywhere, women, man, old or young people even pregnant women consume betel quid everytime. The medicinal components are primarily associated with the nut and betel quid. The nuts contain at least 9 structurally related pyridine alkaloids, including arecoline, arecaidine, arecaine, arecolidine, guvacine, isoguvacine, guvacoline, and coniine. (IARC .2012).

The use of betel nut or betel quid is associated with immediate and long – term physiological effect. The immediate effect can occur within minutes of chewing the betel nut because the ingredients are absorbed directly in to the blood stream via the oral mucosa. Thees effect caused by activation of the symphathetic pathway by the betel nut alkaloids and have been described as a combination of the following symptoms (Rooban et al, 2005 cit WHO 2012))

1. Dizziness and heart palpitation
2. Heightened awareness
3. Hot sensation and sweating
4. Epigastric discomfort and diarrhea
5. Incriased respiration and heart rate
6. Diminished hunger and thirst
7. Relaxed, happy feeling.

Habitual use of betel nut has been associated with a number of long-term adverse health effects ; specific oral effects, including oral precancer and cancer and other type of cancer, heart and respiratory effects, diabetes mellitus, poor pregnancy outcomes and mental illness, addiction and toxic effects. (.chen et al, 2017). A recent meta-analysis of cardiovascular disease (CVD) in Taiwan concluded there is an association between betel nut chewing with or without tobacco and the risk of CVD and betel nut use may even impose a greater risk of CVD than smoking (Zhang et al. 2010). The long-term use of betel nut on respiratory and cardiovascular health remains unclear.

Bronchoconstriction and aggravation of asthma have been demonstrated in betel nut chewers (Kiyingi & Saweri 1994). The authors of the paper recommend that asthma sufferers must avoid using betel nut. The development of a betel nut habit also may increase the use of tobacco and thereby increase its adverse effects on cardiovascular and respiratory health (WHO, 2012).

Betel nut and pregnancy adverse outcomes, for chronic daily use of betel nut has been demonstrated that it is possible to find arecoline in meconium, cord blood and neonatal urine (Pichini et al 2003). Some authors have found that the prevalence of adverse pregnancy outcomes associated with abnormalities, spontaneous abortion, lower birth weight of infants and preterm birth was significantly higher among women who chew betel quid (Yang et al, 2001; Javed et al, 2010); Others have demonstrated that the birth weight of babies born from pregnant betel nut chewers was significantly lower than that of infants born from women of similar age who never chewed betel quid (Pichini et al, 2003).

Study from Garcia-Agar et al, (2005 and López-Vilchez et al. 2006 have reported cases of neonatal withdrawal syndrome in infants born link with mother chronic betel nut users and arecoline, the principal neuroactive alkaloid in betel nuts, has been found in the placental tissue. Senn et al. (2009) in a study of betel nut chewing among pregnant women of Madang Province. Papua New Guinea, reported betel nut chewing had a statistically signifi cant impact on birth weight reduction. The main reasons for pregnant women chewing betel nut were reported as a means of preventing morning sickness and preventing a foul-smelling mouth. Fully 80% of the women thought that chewing betel nut would not have any effect on the fetus.pregnant women use it because it eases nausea and vomiting during the first months of pregnancy .

Components secreted in saliva are important for dental health.The final result caries or not is a complex phenomenon involving internal defense factors, such as saliva, tooth surface morphology, general health, and nutritional and hormonal status, and a number of external factors-for example, diet, the microbial flora colonizing the teeth, oral hygiene, and fluoride availability (Lenander-Lumikari, 2000). Naveen at al. (2014) observ in study comparison between 30 pregnant women in their third trimester and 30 non pregnant women, in the age group of 19-34 years , the increase in the salivary flow rate in pregnant women could be attributed to the increase in the estrogen and progesterone concentration during pregnancy. The buffering action of saliva is an important defense mechanism. A buffer is a solution that tends to maintain a constant pH. Whenever the pH starts falling after the ingestion of a substrate, it returns back to the original resting level after a period of time because of the inherent buffers in the saliva.

Salivary analysis has become an important resource for the evaluation of salivary conditions with physiologic and pathologic implications and is a useful tool for disease diagnosis. Saliva Flow Rate and pH in pregnant women chewing betel quid are interesting to observ because no previous studies have been devoted to this area of interest.The aim of the study was to asses the unstimulated and stimulated Saliva Flow Rate and pH in pregnant women chewing betel nut in Timor kupang Regency Province East Nusa Tenggara

METHODS

A total of one hundred and two pregnant women chewing betel nut from 4 villages in four subdistric who attended in Posyandu constituted the study group. The salivary samples were collected between 9-12 am in both study unstimulated and stimulated saliva.Each subject was requested not to eat, drink or perform oral hygiene or chew or smoke 60 minutes before and during entire study. Subjects were then seated in the chair and asked to spit in a graduated container every 1-minute for 10 minutes.During saliva collection subjects were instructed not to speak or swallow. After collecting the Saliva, Flow Rate was measured and expressed in mL/10 minutes. Salivary pH was measured immediately after measuring Saliva Flow Rate using the Dental Salivary pH Indicator (pH 5.0-8.0, Saliva check buffer Kit, GC Corporation, Tokyo, Japan). Based on the color change of the indicator paper strip, the pH was assessed in comparison with a color chart. Similar methods to assess the stimulated saliva, are pregnant women who consumes betel nut by chewing it, piper betel flower and slaked lime (calcium hydroxide), after chewing and then spit in the container every 1-minutes for 10 minutes. Salivary pH was measured immediately after measuring Saliva Flow Rate using the Dental Salivary pH Indicator (pH 5.0-8.0, Saliva check buffer Kit, GC Corporation, Tokyo, Japan). Based on the color change of the indicator paper strip, the pH was assessed in comparison with a color chart

RESULT

Tabel 1.
Group of Ages among pregnant women chewing betel quid (n=102)

Group of Aged	f	%
< 20 ages	20	18.3
21 - 30 ages	43	43
>30 ages	39	38.7

Tabel 2.
Duration among pregnant women chewing betel quid (n=102)

Range (in year)	f	%
1-10	38	37.6
>10-20	55	55.9
>20	9	6.5

Tabel 3.
For how many time a day pregnant women chewing betel quid (n=102)

Range	f	%
1-2	19	17.2
3-4	40	39.8
>5	43	43.0

Tabel 4.
Mean unstimulated and stimulated Saliva Flow Rate among pregnant
Women chewing betel quid (n=102)

Pregnant women chewing betel quid			
Faktor	Mean	SD	Significance (2-tailed)
Unstimulated Saliva	8.283	1.3414	0.000
Stimulated Saliva	17.969	3.0796	

P<0.05

Tabel 5.
Mean unstimulated and stimulated pH saliva among pregnant
women chewing betel quid (n=102)

Pregnant women chewing betel quid			
Faktor	Mean	SD	Sigificance (2-tailed)
Unstimulated Saliva	6.635	0.458	0.000
Stimulated Saliva	9.291	1.444	

DISCUSSION

Saliva is important in preparing food for mastication, for swallowing, and for normal taste perception. Without saliva, meal times are difficult, uncomfortable (maddu, 2019). Women may be more susceptible to salivary changes because of the unique hormonal changes they experience. Changes in salivary pH can cause periodontal tissue damage.Saliva is composed of water and organic and inorganic molecules, but a large intra- and inter-subject variability in composition is reported (Maddu, 2019). Hormonal changes in females may affect the physiology of the entire body including the oral cavity (Chander et al, 2014). Many studies

have shown that oral mucosa is sensitive to the effect of sex hormones (estrogen and progesteron). They effect the oral cavity and can include bright red swollen gums, swollen salivary gland or bleeding gums any time during the second to eighth month of pregnancy- a condition called pregnancy gingivitis (CDC, 2022) . Besides the direct effect on the metabolism of periodontal tissues, pregnancy, menstruation, and hormone replacement therapy may induce short-term changes in salivary flow rates, buffering capacity, and biochemical composition (Naveen, 2014). Oral changes do occur as consequence of hormonal changes in pregnant women. The salivary flow rate is also modulator of salivary pH. At low flow rate, less bicarbonate is released and pH decreases. On average, women tend to have lower flow rates than men. In addition , at the individual level, women seem to have more variation in their salivary pH as well.This is probably due to hormonal fluctuations.

In this study, 102patients whom are all pregnant women are actively chewing betel quid daily from the four Posyandu from four Sub District area affected. From all 102 pregnant women chewing betel quid unstimulated saliva and stimulated saliva were collected and then analyzed the pH and Saliva Flow Rate. . Change in Salivary Flow Rate and pH saliva in pregnant women chewing betel quid before and after stimulated. In our study , the practice of chewing betel quid use in pregnant women in different age groups. Out of total 102, in goup ages of 21- 30 was higest prevalent pregnant women chewing betel quid 40 %, and then more than 30 years 38.7% and the younger age group of < 20 about 18.3%.

There were significant difference in pH levels between stimulated saliva using betel quid and unstimulated saliva in pregnant women chewing betel quid (Table 3). The salivary pH in pregnant women chewing betel quid were significantly higher in stimulated saliva than unstimulated saliva.Migliario's research (2021) showed that the unstimulated pH in pregnant women leads to acid so that it can damage teeth and irritate the mucosa. Stimulated saliva using betel nut will raise the pH in the mouth. However, research studies using stimulated saliva show that betel nut will raise the pH to alkaline. Although it raises the pH,Many literatures state that the betel nut attached to the gingiva is carcinogenic and will cause cancer(Sharan and Choudhury 2014). Arecolin in the areca nut to cross the placenta to the baby in the mother's womb and damage the pregnancy outcome Mercadal et al, 2014). According to Karasawa (2017) that chewing betel in pregnant women will cause anemia which will affect both mother and child.

Estimation of pH of Saliva using pH meter , most reliable method for measuring pH is by pH meter. Scale of pH meter extends from 0 to 14 (Acidic pH < 7, basic pH >7, neutral = 7). A change of pH by one unit corresponds to 10 fold change in (H positif) concentration of the solution (Fiyaz, 2013). Collection of The Salivary sample and measurement of Flow Rate, patient were advised , that a very small amount of saliva will collect from their mouth in unstimulated state and that the objective of the test was to measure the rate of flow of this secretion. Saliva was collected at least 1 hour after eating. Unstimulate whole saliva was collected by making the patient to sit in upright position at rest, bow their head and tray not to move during the test. Immediately before the test begun, they were instructed to swallow any residual saliva that maybe in their mouth. The saliva was allowed to accumulate for every 1 minute and then expectorated into the collecting vessel. If insufficient saliva was obtained then test maybe conducted for along period of time about 10 minutes. The volume was recorded in a graduated tube. Flow was expressed as ml/min. The Saliva Flow Rate in pregnant women chewing betel quid were significantly higher in stimulated saliva than unstimulated saliva (Tabel 4). A significant increase in the Flow Rate Saliva and pH was seen in pregnant women chewing betel quid before and after chewing betel quid.Abdul Kadhir's research (2015)

concluded that there was an increase in the saliva flow rate in betel nut consumers and a decrease in the saliva flow rate in patients with Oral Submucosa Fibrosis.If you consume betel nut for more than 5 years, OSMF/Oral submucosa fibrosis will usually occur. Oral submucosa fibrosis, in this study estimated as much as 43%..Parameter pH saliva correlation to habit frequency and duration with statistical significance, pH high influenced by the frequency and duration of consuming betel nut.

In Betel quid consume with lime The Increase in the Saliva Flow Rate in pregnant women chewing betel quid could be attributed to the increase in estrogen and progresteron concentration during pregnancy and also attributed of the arecolin in the nut. The mean pH among pregnant women before chewing areca nut 6.635 and statistically significant increase after chewing betel quid pH 9.291 (table 5). The normal pH for healthy people 6.5-7.5. . On the contrary, subjects with decreased salivary mineralization parameters, especially inorganic salivary calcium and phosphate, low salivary pH, reduce salivary flow rate are at higher risk of developing dental caries as their plaque is more acid genic and demineralization of enamel occur more readily (Fiyaz, 2013).According to Lasisi and Ugwuadu (2014) that the concentration of bicarbonate and potassium minerals decreases while the concentration of sodium and phosphate increases and this will cause an increase in the caries rate in pregnant women.Betel nut use can be harmful to oral and dentalhealth. Some harmful effects of betel nut chewing on dental health among other of tooth abrasion and fractured teeth Betel nut chewing can lead to occlusal abrassion and tooth fracture due to its hard fibrous nature.

Shortening of the incisors teeth is one of the complications of betel nut chewing. In arecanut chewers, occlusal surface molar teeth and premolar become smooth. Enamel abrasion anddentinal sensitivity often occur (WHO,2012). Tooth discolorationdepends on the duration of areca nut use and differs from red to black (Anand et al, 2014). According to Shirzaiy and Neshat (2020) in the review about betel chewing that people who regular betel nut chewing reduce tooth decay because, following dental attrition, dentin sclerotic will occur.Another possibility is that the betel nut stain that coats the tooth surface may protect against tooth demineralization and the tannins contained in the betel nut are antimicrobial. When consuming betel nut, the salivary pH will increase and become alkaline, as in this study so that the pH does not approach the critical point of 5.5. downward which will be dangerous with the demineralization process of the teeth so that it will cause dental caries. However, other diseases due to consuming betel nut are also dangerous, especially for pregnant women..Preterm birth, low birth weight, and anemia were most commonly investigated. Meta-analysis revealed a significant association between betel nut use and low birthweight (de Silva et al, 2019)It well known that SFR may greatly vary in an individual and if repeated samples are taken at different time point , varying results will be obtained.

Moreover, regarding poverty in Kupang regency has linked closely to the betel chewing habits. In the era of COVID-19, it seems that more people are falling deep into poverty due to the fact that the prices of daily basic needs (foods, clothes, etc,) has gone up significantly and sometimes does not follow the national standards of pricing. It is because the producers tend to raise the prices of commercial goods and food according to their will in order to get a beneficial profit for themselves, without regarding the average low daily income or the consumers. Although the prices for these basic daily needs are high, but unfortunately due to the addiction, the people in The Kupang regency still found a way to buy betel nuts for their consumption.

CONCLUTION

A significant increase in the Flow Rate Saliva and pH was seen in pregnant women chewing

betel quid before and after chewing betel quid.. also attributed of the arecolin in the nut. The mean pH among pregnant women before chewing areca nut 6.635 and statistically significant increase after chewing betel quid pH 9.291. and pH. The alteration in SFR and pH are vital in causation of various oral diseases. Moreover, the complex action of betel quid chewing in pregnant women is also reflected as variation in SFR and pH.

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