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Antibacterial Effect of Black and Green Tea on Oral Bacteria in Pregnant Women

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Abstract

Aims: To evaluate the antibacterial effect of black and green tea on aerobic and anaerobic bacteria in pregnant women.

Materials and Methods: Sixty pregnant women were submitted for this study . The samples were collected by two different methods, then the alcohol and boiling water extract of black and green tea were used to study the antibacterial effect on eight types of bacteria :Staphylococcus species ,Lactobacillus species ,Oral Streptococci, Porphyromonas species, Prevotella species, Actinobacilus actinomycetecomitans, Fusobacterium species and Actinomyces species.

The results: There is a significant difference between the number of bacterial isolates in pregnant and non-pregnant women in Staphylococcus spp. s, Prevotella spp, Actinobacilus actinomycetecomitans , Fusobacterium spp. and Actinomyces spp. While in two methods used to collect the samples there was a significant difference in Prevotella spp. And the extracts showed antibacterial activity against bacteria at different concentration .Thus the best extract that can affect to the bacteria was Boiling water extract of Green tea.

Conclusion: The boiling water extract of green tea was effective to oral bacteria ,especially periodontal pathogens, so we suggest to use it as mouthwash for the treatment of periodontitis.

Key words: periodontitis ,pregnant women ,black tea, green tea.

Introduction

Pregnancy is defined as a state of physiological stress ,which is accompanied by profound hormonal, biochemical and metabolic[(1)], ısusceptibility to infection like periodontal infection increases during early gestation due to alterations in immune system [(2)]and can be explained by the hormonal changes observed during pregnancy [(3-4)] .
In pregnancy women are ranged from mild inflammation to severe hyperplasia ,pain, bleeding, [(5)]increase gingival probing depth [(6)]increase gingival inflammation [(7)],increase gingival crevicular fluid flow [(8)],increase bleeding upon probing [(9)]and increase tooth mobility [(10)] .The periodontal and gingival inflammation decreases spontaneously three months after delivery ,periodontitis is a multifactorial disease with microbial dental plaque being the initiator [(11)] ,the initiation and progress of periodontal disease depend on the immunological response of the individual to the infection . Periodontist is associated with preterm birth or low birth weight [(12,13)]by bacterial translocation through blood circulation or production of inflammatory mediators [(14,15)]. Moss et.al found that about one quarter of a population of pregnant women demonstrated periodontal progression and defined as an increase of at least 2mm in sites with a probing depth of 4mm or more [(16-17)] .Nowadays ,there is a great concern in alternative and complementary medicine ,especially in antimicrobial agent extracted from natural plant sources [(18)], green and black tea come from the leaves of the plant Camellia sinensis .However , processing the leaves undergo to make the final tea is different .The leaves of black tea are fully oxidized while those of green tea are lightly steamed before being dried ,black and green tea both contain similar amounts of flavonoids however ,they differ in their chemical structure ,Green tea contains more of the simple flavonoids called catechins, while the oxidization that the leaves undergo to make black tea converts these simple flavonoids to the more complex varieties called theaflavins and thearubigins .Black teas mostly come from plantations in Africa ,India ,Sri lanka and Indonesia while green teas come from countries in the far east such as China and Japan[(19-20)]. Green tea (Camellia sinensis) is a rich source of polyphenols, particularly flavonoids that have beneficial effects in the treatment of certain forms of cancer, arthritis and cardiovascular disorders [(21-22)] .

Materials and Methods

Sample collection

Sixty pregnant women submitted to this study and thirty non- pregnant women sample:

A-paper point

Subgingival plaque samples were obtained from the patients by inserting sterile paper point size 50 for 30 seconds in a selected pocket of specific depth ,then the paper point placed immediately in a sterilized screw-caped vials and transport directly to the laboratory for incubation and identification[23].

B-Pooled plaque :

The pooled plaque subgingival plaque obtained by collecting subgingival plaque from the most apical part of the gingival pockets without contamination from other sources. Prior to sampling saliva ,debris and plaque were carefully removed from the gingival margin and supragingival area with sterile cotton ,the sharp ,sterile curette was used for collection of subgingival plaque, The bacterial samples were suspended in 1 ml sterile 1%sodium chloride solution in 5 ml screw capped vials and mixed with vortex shaker for 30 seconds ,then 25 µl were transported to the lab rotations for incubation and identification[24].

Extraction

A-Alcoholic extraction

120ml of 95%ehtanol were added to 40 gm of the powder plant in sterile flask ,left for 3 days at room temperature and filtered with No.1 filter paper ,then the extract left at 37 Cº until it become dry then sterilized the extract and made the concentrations 20%(200mg\ml),15%(150mg\ml) and 10%(100mg\ml) [25].

B -Boiling water extraction

120 ml of sterilize distilled water added to 40 gm of dried plant, then boiled at 100Cº for 15 minuets ,the solution left to become warm and then filtered by No. 1 filter paper and autoclaved at 40Cºuntile the extract became dry then we made the same concentrations above.[26]

Anti Bacterial Susceptiblity Test:

The antibacterial tests of the leaf extracts were tested for the bacteria using paper diiscs diffusion inhibition test ,sterile paper discs were soaked in the leaf extract for 2 hours .0.2 ml of a24 hour broth culture of the bacteria species was spread on the surface of sterile Muller –Hinton agar plates. The paper disks containing the extracts at different concentrations were placed in different areas on the surface of each plate .The plates were incubated at 37Cºfor 24hours .The antibacterial activity of the extract against the test bacteria was indicated by growth -free“ zone of inhibition” near the respective disk and compare with the chlorhexidine gluconate mouthwash 0.2% as a positive control[27].

Results

Sixty samples were collected in this study from periodontitis in pregnant women and thirty samples of periodontitis in non-pregnant women as controlling .The samples were collected by different methods (paper point ,pooled plaque)who attended dental Education Hospital ,Department of Periodontics ,College of Dentistry ,Mosul University is asking for diagnosis and treatment as showed in table(1)

Table (1): the distribution of samples according to different method of sample collection.

type of method		No.of samples	total
sample collection	paper point(pregnant women)	30	60
	pooled plaque(pregnant women)	30	
	control(non-pregnant women)	30	30

There is a significant difference between pregnant and non-pregnant women ,which effected to the number of bacterial isolates at $p \leq 0.05$ on Staphylococcus spp, Prevotella spp, Actinobacilus actinomycetecomitans, fusobacteriumssp and Actinomyces spp.as showed in table (2).

Table (2) Distribution of bacteria isolates in pregnant and non-pregnant women who suffer from periodontitis

aerobic &anaerobic bacteria	pregnant	non-pregnant	total	p-vaue
Staphylococcus spp	10	4	14	0.057
Oral streptococci	10	6	16	0.289
Lactobacilluss spp.	12	6	18	0.094
Pophyromonas spp.	6	6	12	1.000
Prevotella spp.	10	3	13	0.017
Actinobacilus actinomycetecomitans	15	5	20	0.004
fusobacteriumssp.	11	4	15	0.027
Actinomyces spp.	9	2	11	0.009

Statistically significant at $p \leq 0.05$

And there is a non -significant differences between the method of the collection of the samples by paper point and pooled plaque which effect the number of bacterial isolates at $p \leq 0.05$ except Prevotella spp. as shown in table (3)

Table (3): Distribution of bacteria isolates in two methods (paper point and pooled plaque)in pregnant women who suffer from periodontitis

aerobic &anaerobic bacteria	pooled plaque	paper point	total	p-value
Staphylococcus spp.	9	5	14	0.257
Oral streptococci	10	6	16	0.289
Lactobacilli spp.	10	8	18	0.740
Pophyromonas spp.	4	8	12	0.220
Prevotella spp.	6	14	13	0.026
Actinobacilus actinomycetecomitans	6	5	20	1.000
Fusobacterium spp.	6	9	15	0.466
Actinomyces spp.	4	7	11	0.395

Statistically significant at $p \leq 0.05$

Three concentrations of plant extracts were used, Alcoholic and Boiling water extract were effective to differences types of aerobic and anaerobic bacteria, ANOVA test showed highly significance differences between groups of different concentration of alcoholic extract of black tea, then used Duncn's test to demonstrate the best group was significant to be effective to the bacteria as showed in table (4a ,4b) and the histogram(1)

Table (4)a: ANOVA of all types of bacteria after the use of three concentration of Alcoholic extract of black tea

type of bacteria		Sum of Squares	df	Mean Square	F	Sig
Staphylococccci spp.	Between Groups	552,357	3	184,119	48,320	,000
	Within Groups	198,143	52	3,810		
	Total	750,500	55			
Lactobacilli spp.	Between Groups	629,891	3	209,964	59,247	,000
	Within Groups	205,545	58	3,544		
	Total	835,435	61			
oral Streptococci	Between Groups	344,063	3	114,688	52,429	,000
	Within Groups	96,250	44	2,188		
	Total	440,313	47			
Porphyromonas spp.	Between Groups	344,063	3	114,688	52,429	,000
	Within Groups	96,250	44	2,188		
	Total	440,313	47			
Prevotella spp.	Between Groups	317,692	3	105,897	36,508	,000
	Within Groups	139,231	48	2,901		
	Total	456,923	51			
Actinobacilus actinomycetecomitans	Between Groups	995,238	3	331,746	118,508	,000
	Within Groups	212,750	76	2,799		
	Total	1207,988	79			
fusobacterium spp.	Between Groups	108,743	3	36,248	11,695	,000
	Within Groups	176,667	57	3,099		
	Total	285,410	60			
Actinomyces spp.	Between Groups	73,091	3	24,364	9,289	,000
	Within Groups	104,909	40	2,623		
	Total	178,000	43			

highly significant at p value ≤ 0.01

b-Duncan's new multiple range test for antibacterial effect of Alcoholic extract of Black Tea on different types of bacteriaa

type of bacteria	concentration	No.of bacterial isolates	Mean±SD	Duncan's grouping *
Staphylococci spp.	CHX)1(	14	23,2857±2,89372	D
	(100)2		9,4286±1,55486	A
	(150)3		19,8571±1,61041	B
	(200)4		18,0000±1,03775	C
Lactobacilli spp.	CHX)1(	18	24,7778±2,31505	C
	(100)2		20,0000±1,81497	B
	(150)3		19,8333±2,33263	B
	(200)4		18,1111±2,11128	A
oral Streptococci	CHX)1(	16	15,2500±1,76455	D
	(100)2		8,0000±,73855	A
	(150)3		10,0000±1,59545	B
	(200)4		12,0000±1,59545	C
Porphyromonas spp.	CHX)1(	12	15,2500±1,76455	D
	(100)2		8,0000±,73855	A
	(150)3		10,0000±1,59545	B
	(200)4		12,0000±1,59545	C
Prevotella spp.	CHX)1(	13	15,2500±1,76455	D
	(100)2		8,oooo±,73855	A
	(150)3		10,0000±1,59545	B
	(200)4		12,0000±1,59545	C
Actinobacilus actinomycetecomitans	CHX)1(	20	15,9500±1,70062	A
	(100)2		16,0000±2,02614	B
	(150)3		8,1000±1,02084	C
	(200)4		10,0000±1,77705	C
Fusobacterium spp.	CHX)1(	15	14,6667±1,67616	C
	(100)2		12,0000±1,46385	A
	(150)3		13,3333±1,44749	B
	(200)4		15,5000±2,28035	C
Actinomyces spp.	CHX)1(	11	19,9091±1,13618	C
	(100)2		17,9091±1,92117	B
	(150)3		17,9091±1,86840	B
	(200)4		16,2727±1,42063	A

*The different letters mean significant difference exists.

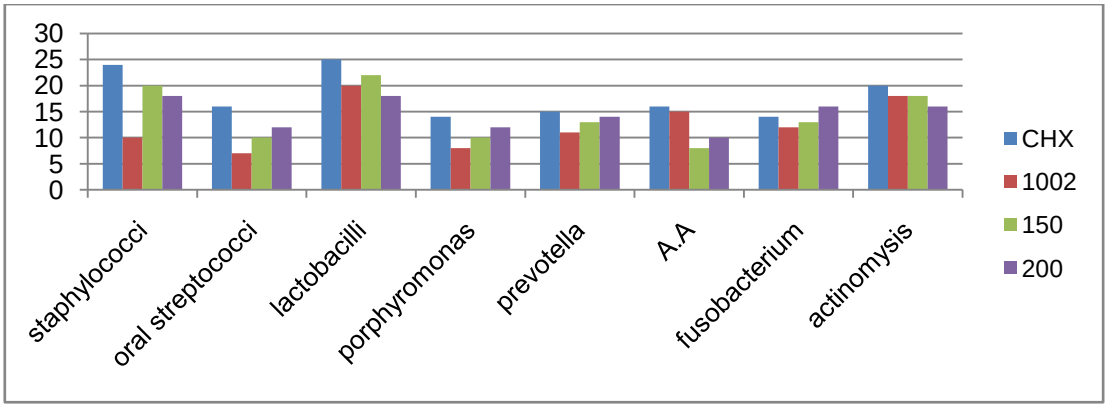

Figure (1): A Histogram showing antibacterial effect of Alcoholic extract of Black Tea against different types of bacteria.

ANOVA test showed highly significance differences between groups of different concentrations of boiling water extract of Black Tea ,then used Duncns test to demonstrate the best group which was significant to the effect on the bacteria as showed in table (5a ,5b) and the histogram(2)

Table (5)a-ANOVA of all types of bacteria after using three concentration of boiling water extract of black tea

type of bacteria		Sum of Squares	df	Mean Square	F	Sig
Staphylococcci	Between Groups	374,500	3	124,833	56,942	,000
	Within Groups	114,000	52	2,192		
	Total	488,500	55			
Lactobacilli	Between Groups	253,722	3	84,574	25,441	,000
	Within Groups	226,056	68	3,324		
	Total	479,778	71			
oral streptococci	Between Groups	3888,000	3	1296,000	441,818	,000
	Within Groups	176,000	60	2,933		
	Total	4064,000	63			
Porphyromonas	Between Groups	983,563	3	327,854	130,058	,000
	Within Groups	110,917	44	2,521		
	Total	1094,479	47			
prevotella	Between Groups	884,000	3	294,667	78,578	,000
	Within Groups	180,000	48	3,750		
	Total	1064,000	51			
Actinobacilus actinomycetecomitans	Between Groups	3086,474	3	1028,825	274,356	,000
	Within Groups	281,247	75	3,750		
	Total	3367,722	78			
fusobacterium	Between Groups	491,384	3	163,795	43,294	,000
	Within Groups	211,866	56	3,783		

	Total	703,250	59			
Actinomyces	Between Groups	1535,000	3	511,667	99,528	,000
	Within Groups	205,636	40	5,141		
	Total	1740,636	43			

highly significant at p value ≤ 0.01

b-Duncan's new multiple range test for antibacterial effect of Boiling water extract of black tea of Black Tea on different types of bacteria

type of bacteria	concentration	No.of bacterial isolates	Mean±SD	Duncan's grouping *
Staphylococci	CHX)1(	14	25,0000±1,51911	D
	(100)2		18,0000±1,51911	A
	(150)3		20,0000±,96077	B
	(200)4		22,0000±1,79743	C
Lactobaciussi	CHX)1(	18	12,8421±2,40978	C
	(100)2		8,7059±1,82909	A
	(150)3		10,0000±1,45521	B
	(200)4		8,0000±1,37199	A
Oral Streptococci	CHX)1(	16	18,0000±3,42540	B
	(100)2		,0000±,00000	A
	(150)3		,0000±,00000	A
	(200)4		,0000±,00000	A
Porphyromonas spp.	CHX)1(	12	20,0000±2,44949	D
	(100)2		8,0833±,66856	A
	(150)3		10,0000±1,47710	B
	(200)4		13,0000±1,20605	C
Prevotella spp.	CHX)1(	13	20,0000±2,85774	D
	(100)2		10,0000±,57735	A
	(150)3		12,0000±1,47196	B
	(200)4		18,0000±2,08167	C
Actinobacilus actinomycetecomitans	CHX)1(	20	18,0000±2,36198	C
	(100)2		,7500±2,31414	A
	(150)3		11,3500±1,49649	B
	(200)4		12,0526±1,31122	B
Fusobacterium spp.	CHX)1(	15	15,0000±2,10442	C
	(100)2		8,0625±1,43614	A
	(150)3		10,0714±1,97929	B
	(200)4		14,0000±2,20389	C
Actinomyces spp.	CHX)1(	11	18,0909±2,34327	D

	(100)2		1,5455±3,44568	A
	(150)3		8,0000±,63246	B
	(200)4		10,0000±1,67332	C

*The different letters mean significant difference exists.

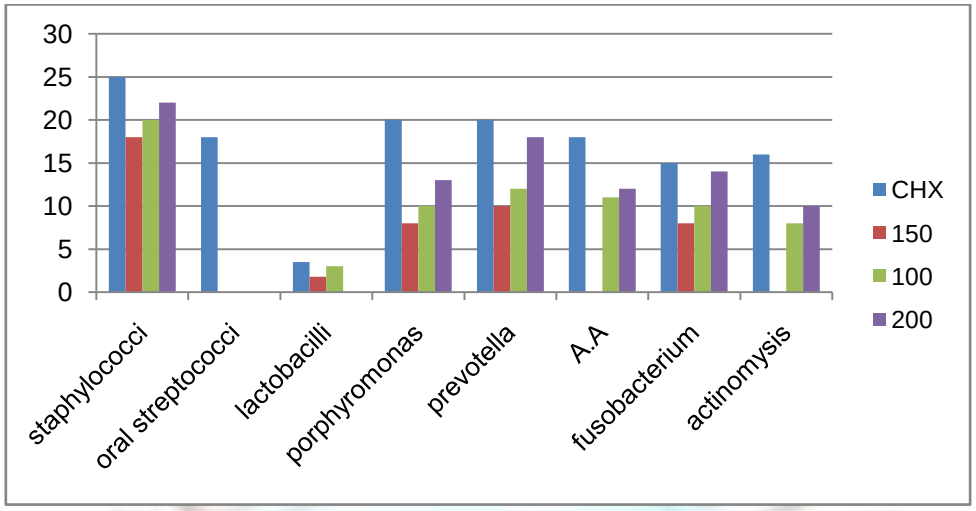

Figure (2): A Histogram showing antibacterial effect of Boiling water extract of Black Tea against different types of bacteria.

ANOVA test showed highly significance differences between groups of different concentrations of Alcoholic extracts of Green Tea ,then used Duncn's test to demonstrate the best group which was significant tothe effect on the bacteria as showed in table (6a ,6b) and the histogram(3)

Table (6)a-ANOVA of all types of bacteria after using three concentration of alcoholic extract of green tea

type of bacteria		Sum of Squares	df	Mean Square	F	Sig
Staphylococccci	Between Groups	91,107	3	30,369	2,638	,000
	Within Groups	598,607	52	11,512		
	Total	689,714	55			
Lactobacilli	Between Groups	445,168	3	148,389	24,622	,000
	Within Groups	385,714	64	6,027		
	Total	830,882	67			
oral Streptococci	Between Groups	1808,375	3	602,792	176,105	,000
	Within Groups	205,375	60	3,423		
	Total	2013,750	63			
Porphyromonas	Between Groups	420,000	3	140,000	78,974	,000
	Within Groups	78,000	44	1,773		
	Total	498,000	47			
Prevotella	Between Groups	27,231	3	9,077	4,377	,000
	Within Groups	99,538	48	2,074		

	Total	126,769	51			
Actinobacilus actinomycetecomitans	Between Groups	290,537	3	96,846	33,312	,000
	Within Groups	220,950	76	2,907		
	Total	511,487	79			
Fusobacterium	Between Groups	727,902	3	242,634	102,283	,000
	Within Groups	180,286	76	2,372		
	Total	908,188	79			
Actinomyces	Between Groups	491,250	3	163,750	95,521	,000
	Within Groups	96,000	56	1,714		
	Total	587,250	59			

highly significant at p value ≤ 0.01

b-Duncan's new multiple range test for antibacterial effect of alcoholic extract of green tea on different types of bacteria

type of bacteria	concentration	No.of bacterial isolates	Mean±SD	Duncan 's grouping*
Staphylococci	CHX)1(	14	23,2857±3,96967	C
	(100)2		20,0000±3,84308	A
	(150)3		22,1250±2,72947	B
	(200)4		23,0000±2,86039	AB
Lactobacilli	CHX)1(	18	25,0000±2,35147	C
	(100)2		17,8571±2,50713	A
	(150)3		21,6667±2,14202	B
	(200)4		20,0000±2,78652	B
oral Streptococci	CHX)1(	16	14,0000±1,67332	C
	(100)2		,8125±2,22767	A
	(150)3		12,0000±1,89737	B
	(200)4		12,9375±1,52616	AB
Porphyromonas	CHX)1(	12	12,0000±1,04447	A
	(100)2		18,0000±1,04447	C
	(150)3		16,0000±1,27920	B
	(200)4		20,0000±1,80907	D
Prevotella	CHX)1(	13	18,6923±1,49358	A
	(100)2		18,6923±1,43670	A
	(150)3		18,0000±1,00000	A
	(200)4		20,0000±1,73205	B
Actinobacilus actinomycetecomitans	CHX)1(	20	18,0000±1,97351	C

	(100)2		13,0500±1,39454	A
	(150)3		14,0000±1,77705	A
	(200)4		16,0000±1,62221	B
Fusobacterium	CHX)1(	15	10,0000±1,55839	B
	(100)2		8,0000±,84515	A
	(150)3		15,0000±1,25357	C
	(200)4		15,1429±1,83340	C
Actinomyces	CHX)1(	11	11,0000±6,07644	B
	(100)2		,7500±2,12132	A
	(150)3		12,0000±1,67332	B
	(200)4		16,0000±,63246	C

*The different letters mean significant difference exists.

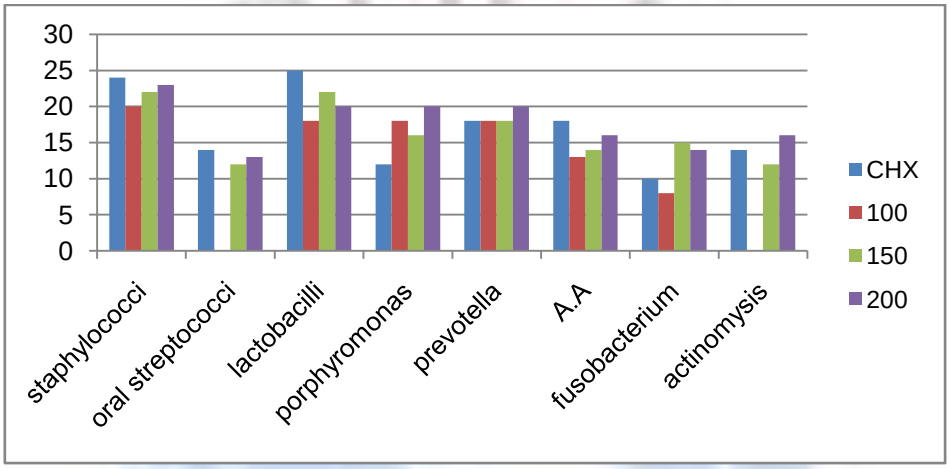

Figure (3): A Histogram showing antibacterial effect of Alcoholic extract of Green Tea against different types of bacteria.

ANOVA test showed highly significance differences between groups of different concentrations of Boiling water extract of Green Tea ,then used Duncn's test to demonstrate the best group which was significant tothe effect on the bacteria as showed in table (7a ,7b) and the histogram(4)

Table (7)a-ANOVA of all types of bacteria after using three concentration of Boiling water extract of Green Tea

type of bacteria		Sum of Squares	df	Mean Square	F	Sig
Staphylococcci	Between Groups	508,286	3	169,429	32,944	,000
	Within Groups	267,429	52	5,143		
	Total	775,714	55			
Lactobacilli	Between Groups	680,222	3	226,741	108,921	,000
	Within Groups	141,556	68	2,082		
	Total	821,778	71			
oral streptococci	Between Groups	238,688	3	79,563	77,308	,000
	Within Groups	61,750	60	1,029		

	Total	300,438	63			
Porphyromonas	Between Groups	636,000	3	212,000	84,800	,000
	Within Groups	110,000	44	2,500		
	Total	746,000	47			
Prevotella	Between Groups	958,604	3	319,535	241,259	,000
	Within Groups	59,600	45	1,324		
	Total	1018,204	48			
Actinobacilus actinomycetecomitans	Between Groups	212,035	3	70,678	42,381	,000
	Within Groups	108,400	65	1,668		
	Total	320,435	68			
fusobacterium	Between Groups	186,450	3	62,150	23,882	,000
	Within Groups	145,733	56	2,602		
	Total	332,183	59			
Actinomyces	Between Groups	220,000	3	73,333	81,481	,000
	Within Groups	36,000	40	,900		
	Total	256,000	43			

highly significant at p value ≤ 0.01

b-Duncan's new multiple range test for antibacterial effect of boiling water extract of green tea on different types of bacteria

type of bacteria	concentration	No.of bacterial isolates	Mean±SD	Duncan's grouping *
Staphylococci	CHX)1(	14	24,8571±2,47626	C
	(100)2		24,8571±2,47626	C
	(150)3		20,0000±2,03810	B
	(200)4		18,0000±2,03810	A
Lactobacilli	CHX)1(	18	25,1111±1,02262	C
	(100)2		18,1111±1,13183	A
	(150)3		20,0000±1,49509	B
	(200)4		25,0000±1,94029	C
oral Streptococci	CHX)1(	16	18,1250±1,45488	A
	(100)2		18,0000±,00000	A
	(150)3		18,0000±,00000	A
	(200)4		22,5000±1,41421	B
Porphyromonas	CHX)1(	12	35,0000±1,04447	D
	(100)2		25,0000±1,04447	A
	(150)3		28,0000±1,85864	B

	(200)4		30,0000±2,08893	C
Prevotella	CHX)1(	13	25,0000±1,00000	C
	(100)2		15,0000±1,00000	A
	(150)3		18,0000±1,00000	B
	(200)4		25,2000±1,61933	C
Actinobacilus actinomycetecomitans	CHX)1(	20	14,0000±1,52177	C
	(100)2		10,0000±1,25656	A
	(150)3		10,0000±1,10554	A
	(200)4		11,6000±1,17379	B
Fusobacterium	CHX)1(	15	20,6667±2,05866	B
	(100)2		17,0000±1,13389	A
	(150)3		18,0000±1,13389	A
	(200)4		21,2000±1,89737	B
Actinomyces	CHX)1(	11	14,0000±1,09545	C
	(100)2		10,0000±,44721	A
	(150)3		12,0000±1,00000	B
	(200)4		16,0000±1,09545	D

*The different letters mean significant difference exists.

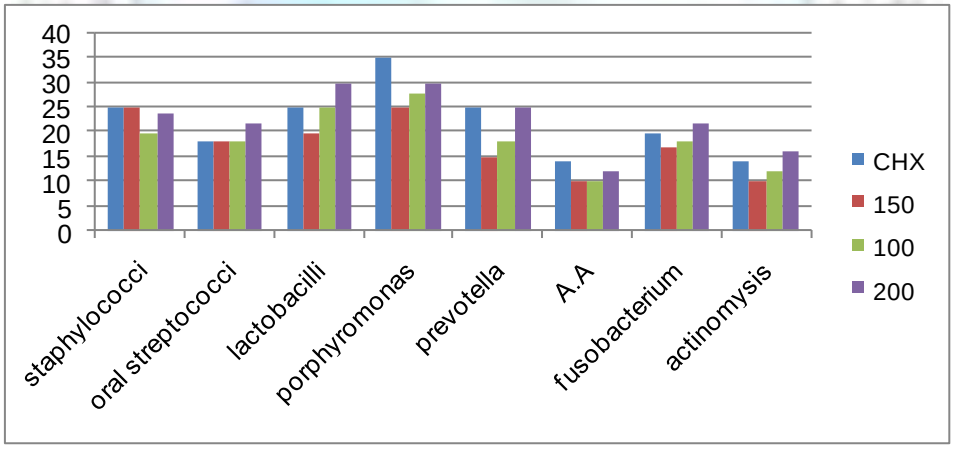

Figure (4): A Histogram showing antibacterial effect of boiling water extract of Green Tea against different types of bacteria.

Discussion

Periodontitis in pregnancy has a prevalence of between 5%and 20%in pregnant women ,treatment in pregnancy is safe and easily applicable and involves scaling and root planning ,and the women who have periodontal diseases are at a 7.5 time higher risk for delivering preterm low birth weight babies than women who do not have periodontal disease[28-29] .Bacterial culturing especially anaerobic remains a very valuable and useful method for examining periodontalpathogenes and allows detection of other infrequently isolated pathogens and their antimicrobial susceptibility testing[30] . Our study found increased in aerobic and anaerobic bacteria in pregnant women compare to non pregnant women ,and the highest number was the Actinobacillus actinomycetecomitans which is the main cause of periodontitis ,and the study found the highest number of aerobic bacteria in pooled plaque method compared to the highest number of anaerobic bacteria in paper point method , Hussein et al . [31] , Boyanova et.al[32]and Al-azzawi[33] found in their studies a high prevalence of anaerobic bacteria in periodontitis. In the last few years ,an increased

attention has been focused on the natural plant extracts ,especially those containing phenolic compounds with antimicrobial and antioxidant properties. Black tea drinking is widely in Iraq and green tea is drunk for the last ten years , so we need many studies to analyze their compounds and study their effect on the bacteria.
Alcoholic extract of black tea gave antibacterial effect for all types of bacteria used in this study and showed the highest effect on fusobacterium spp. Compare to chlorohexiden glugonate 0.2 % .Abdul-Rahman found that ethanolic extract of black and green tea exhibited antibacterial activity against Escherechia coli ,staphylococcus aureus ,Actinobacilus actinomycetecomitans, viridand streptococci and black pigmented bacteria[(34)]. In the study the chlorohexiden glugonate 0.2 %showed the best effect compared to the boiling water extract of black tea which effect to Staphylococcus spp.,Porphyromonas spp., Prevotella spp., Actinobacilus actinomycetecomitans, fusobacterium spp.,and Actinomyces spp .Abd-allaha et al. found the black tea have Anticariogenic effect on Streptococuus mutans and lactobacillus spp.[(18).]

Alcoholic extract of green tea showed good antibacterial activity against Staphylococcus spp. ,Lactobacillus spp., Porphyromonas spp.and Prevotella spp. while the boiling water extract of green tea show a very good antibacterial activity on Actinomyces spp., fusobacterium spp., prevotella spp. Lactobacillus spp. and oral streptococci compare to chlorhexidine gluconate 0.2% . Abd-Allaha et al .reported that daily consumption of green tea can kill gram positive S.aureus and other harmful bacteria .also ,it has been reported that the green tea contains catechin and polyphenols .These compounds have been found to possess antibacterial and antiviral action as well as anticariogenic and antimutagenic properties .This suggests that these compounds could be responsible for the inhibition of pathogens[(18)]

Conclusion

Alcoholic and boiling water extracts of black and green tea were effective as antibacterial agents against the aerobic and anaerobic oral bacteria ,especially the periodonto pathogens so we suggest to use them in treatment and prevention of gingivitis and periodontitis.

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