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The Prevalence of Impacted Mandibular Wisdom with Associated Physical Signs and Microbial Infections among under Graduate Girls at Taif University, KSA

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Abstract: The aims of this study were to detect the presence of impacted lower mandibular third molars (IW) and the medical complications among outpatients at Taif Uni. KSA, throughout (2012). The study was concerned with the determination of type of impaction, physical signs and predominant microorganisms. The examined complained students (No.=113) with age (18-26yrs.), were subjected for clinical, dental and microbial examinations. Total impacted wisdoms (IW) were 49.6%. According to the site, (Uni. and Bi.) had prevalence of 67.9 and 32.1%, respectively. According to the position, (MA. and V.) displayed incidence of 64.3 and 35.7%, respectively. The most common complaints were pain 76.8%, pericoronitis 62.5%, periodontal pocketing 57.1%, trismus 51.8%, cheek biting 39.3%, cellulitis 32.1% and abscess formation 19.6%. The accompanied vital signs were septic S.T. 55.4%, lymphadenitis 76.8% and fever 66.1%. The aerobic and facultative anaerobic isolates were *Strept. Viridans*, *Corynebacterium spp*. *Haemophilus spp*. *Strept. mutans,* CNS*, Staph. aureus, Strept. pneumoniae, E. coli, Strept. pyogenes* and *Pseudomonas spp.*. with incidence of 90.5, 60.8, 56.8, 52.7, 45.9, 25.7, 23, 23, 14.9 and 10.8% and anaerobic isolates were *Prevotella spp*. *Fusobacterium spp. Actinomyces spp. Bacteroides spp. Lactobacillus spp. Campylobacter spp.* and *Clostridium spp.* had incidence of 98.6, 90.5, 81.1, 81.1, 70.3, 54 and 41.9% respectively.

Key words: Impacted Wisdom • Pericoronitis • Periodontal • Trismus • Septic S. T. Lymphadenitis • Fever

INTRODUCTION

Impaction, means prevention of the tooth from eruption in its scheduled date, a tooth is impacted if the time of its eruption had passed. Impacted mandibular third molar (impacted wisdom, IW) is classified into three classes in relation to the distance between the distal surface of the second molar and the anterior border of the ascending ramus of the mandible [1]. IW is a public problem frequently faced by oral surgeons all over the world. Accompanying symptoms to the partially IW are variable: including local pain, pericoronitis, sore throat, facial cellulitis, facial space infection, abscess formation and trismus [2]. Mandibular wisdoms are more frequently impacted than maxillary and mesioangular impaction (MA) is the most common type of impaction encountered [3, 4]. The operculum covering the partially IW may be superimposed by microbial infection and the mixed microbial infections are the principal causes of dental infections and lymphadenitis [5]. The incidence of odontogenic infections has decreased in recent years by improvements in orodental and general health care. Odontogenic infections are not caused by a single organism but polymicrobial infections are frequently encountered and in some cases up to 6 different species had been isolated [5-9], though their presence suggests that they could collaborate in the infectious process by supplying nutrients or growth factors, creating favorable pH conditions and simply antagonizing other microorganisms [10, 11]. Odontogenic infections are produced by pericoronitis and periapical lesions with well-known origins. A wisdom tooth can become infected, either by gum disease, or tooth decay and necrosis of the tooth's nerve, leading to an abscess formation [1, 5]. An infected wisdom tooth can also lead to single space and multi-space infections around your head and neck.

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One may notice symptoms such as drainage of pus, swelling, significant fever, pain, difficulty swallowing, breathing and opening the mouth and inflammation of regional lymph nodes. This can be the result of a wisdom tooth that was difficult to clean. Face, throat and neck swelling which can cause difficulty of breathing as well [12-14].

Bacteriological examination of pericoronal pockets revealed that microorganisms are more often isolated from infected third molars [7, 8] and bacterial species isolated belong to the normal oral flora in patients with oral infections. These bacteria are found in healthy mouths and can also act as pathogens if the predisposing factors are present; disturbance of the microbial balance and disruption of mucosal barriers by spontaneous or induced trauma [15]. It was found that the incidences of organisms isolated from third molars are 40% *Corynebacterium spp.* 80% *Prevotella denticola* and 40% *Lactobacillus spp.* [16]. Besides obligate anaerobic bacteria, *Actinomyces spp*. a predominantly facultative anaerobic bacterium was isolated [17]. Heidrun *et al.* [19] reported that the predominant micro-flora in pericoronitis is anaerobic similar to that found in chronic periodontitis, although proposed marker organisms of severe periodontitis are absent. Jean *et al.* [16] found the isolates from pericoronitis are *Strept. Actinomyces, Prevotella, Bacteroides, Fusobacterium, Campylobacter, Staph. Lactobacillus, Haemophilus*. The micro-flora in pericoronitis appeared similar to that of diseased periodontal pockets. Most microbes causing pericoronitis are obligatory anaerobic bacteria. Dental plaque provides the medium for growth of bacteria, mostly such as *Strept. spp*. and *Actinomyces spp*. are the most frequent on oral mucosa and crypts of the tongue [20-22]. Most of the indigenous anaerobes are part of the normal oral flora and act as a defending barrier against pathogens [26]. Tongue has been considered as the major source of common salivary bacteria, such as Gram-positive facultative cocci [27] and obligatory anaerobic Gram-negative species Are normally found in periodontal pockets and on various oral surfaces, such as *Bacteroides* [7, 28-30]. Same bacterial species can be found concomitantly because highly contaminated saliva flows freely between anatomically close sites. *Strept. mutans*, *Lactobacillus* and *Prevotella oralisi* are the causative pathogens of acute and chronic pericoronitis [29, 30]. The infections may damage mucous membranes and predispose tissues to secondary bacterial infection [31, 32]. The anatomical close relationship between microbes of IW with pericoronitis, may favor the hypothesis that some of the causative agents of acute or chronic pericoronitis and septic sore throat, are the same and increase the risk of pericoronitis [36, 37].

The main targets of this study were to investigate the presence of IW and the related complications among girl students visited outpatient polyclinic at Taif University, throughout 2012.

MATERIALS AND METHODS

Study Field: The research was conducted at Quarwa branch of Taif Univ. KSA. The patients under the study (No.=113) were selected from those complained of IW attending the outpatient medical and dental clinics of the medical administration. The age was in the range of (18-26 yrs.). The patients data, vital signs, chief complains were recorded into the diagnostic sheet. The microbial specimens were collected under aseptic condition according to the type of impaction.

Physical Examination: General clinical examination registered sore throat, lymphadenitis and fever. The neck was examined for presence of enlarged, tender cervical lymph nodes, difficulty of swallowing [37, 38].

Dental Examination: Patients complaining of IW with pericoronitis and associated sore throat were included, those presenting with a partially erupted molar were defined as to have class IA, IB, 2A, 2B [1]. Furthermore, Patients were instructed not to use antiseptic rinses in the previous 24 hrs. All students included in this study signed an informed consent form for participation in this research study. In case of pericoronitis due to IW, the bacterial plaque was removed from the surface of the second and third molars with the aid of sterile cotton swabs, after abundant irrigation with saline; a muco-periosteal flap was raised, luxation and avulsion of the third molar was performed.

Microbial Identification: The specimens were collected using sterile paper tips and were seeded onto culture media at that moment in the operating room. All collected samples (paper tips, puncture-aspiration) and pathological tissues were collected intra-operatively. All samples were placed immediately into an Eppendorff tube and kept deep-frozen (-70°C) until sent for analyses in carbon dioxide ice. The samples were analyzed in Microbial Laboratory by standard methods [40, 41].

Data Analysis: The data recorded during the study period (2012) were entered into Microsoft excel sheet. Data were summarized and analyzed using SPSS version 16 computer program. Data were analyzed using Epi Info version 6 statistical software and for further comparison Chi-square test was used at critical probability of $p<0.05$ [42].

RESULTS

Table (1) and Diagram (1) show the prevalence of IW among complained students visiting out-patient clinic, the total IW was 49.6% consisting of three age grades (18-20yrs.), (21-23yrs.) and (24-26yrs.), with percentages of 46.9, 57.4 and 41.2%, respectively. According to site of IW, the incidence of (unilateral and bilateral) was 67.9 and 32.1%, respectively; the highest incidence of unilateral site was 73.3 (18-20yrs.) followed by 66.7 (21-23yrs.) and 64.3 (24-26yrs.). The bilateral sites incidences in grades (24-26yrs.), (21-23yrs.) and (18-20yrs.) were 35.7, 33.3 and 26.7% respectively. According to position of IW, mesioangular and vertical (MA. and V.) positions had 64.3 and 35.7%, for MA. position 80, 78.6 and 48.1% were in grades (18-20yrs.), (25-26yrs.) and (21-23yrs.), while the V. positions had 51.9, 21.4 and 20% in grades (21-23yrs.), (24-26yrs.) and (18-20yrs.), respectively.

Table (2) and Diagram (2) show the prevalence of local dental signs associated with IW, the most common complaints were pain (76.8%), pericoronitis (62.5%), periodontal pocketing (57.1%), trismus (51.8%), cheek biting (39.3%), cellulitis (32.1%), then abscess formation (19.6%).

Table (3) and Diagram (3) show the prevalence of vital signs associated with IW, including septic S.T. lymphadenitis and fever. The most popular sign was lymphadenitis (76.8%), it was highest in (18-20yrs.) with Bi. 100%, then the same grade of age with Uni. 81.8%.

Table (4) and diagram (4) show the prevalence of aerobic and facultative anaerobic bacteria associated with IW. *Strept. Viridans, Corynebacterium. spp. Haemophilus spp. Strept. mutans,* CNS*, Staph. aureus,*

Table 1: Prevalence of IW among Complained Students Visiting Outpatient Clinic

			Site of impaction		Type of impaction	
Age yrs.	Cases No.	IW No.(%)	Uni.No.(%)	Bi.No.(%)	MA.No.(%)	V.No.(%)
18-20	32	15(46.9%)	11(73.3%)	4(26.7%)	12(80%)	3(20%)
21-23	47	27(57.4%)	18(66.7%)	9(33.3%)	13(48.1%)	14(51.9%)
24-26	34	14(41.2%)	9(64.3%)	5(35.7%)	11(78.6%)	3(21.4%)
Total	113	56(49.6%)	38(67.9%)	18(32.1%)	36(64.3%)	20(35.7%)

*IW: Impacted wisdom, Uni.: Unilateral, Bi.: Bilateral, MA: Mesioangular, V.: Vertical, yrs.: Years

Table 2: Prevalence of Local Dental Signs Associated with IW among Investigated Patients

Cases Age yrs.(No.)	Pain	Pericoronitis	Periodontal pocketing	Cellulitis	Cheek biting	Truisms	Abscess formation
Site of impaction	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
18-20yrs. (11) Uni.	9(81.8%)	7(63.6%)	6(54.5%)	3(27.3%)	6(54.5%)	4(36.4%)	2(18.2%)
18-20yrs. (4) Bi.	4(100%)	2(50%)	2(50%)	2(50%)	2(50%)	4(100%)	1(25%)
21-23yrs. (18) Uni.	11(61.1%)	12(66.7%)	6(33.3%)	4(22.2%)	5(27.8%)	6(33.3%)	3(16.7%)
21-23yrs. (9) Bi.	9(100%)	7(77.8%)	7(77.8%)	5(55.6%)	4(44.4%)	7(77.8%)	2(22.2%)
24-26yrs. (9)Uni.	7(77.8%)	4(44.4%)	7(77.8%)	2(22.2%)	3(33.3%)	4(44.4%)	1(11.1%)
24-26yrs. (5) Bi.	3(60%)	3(60%)	4(80%)	2(40%)	2(40%)	4(80%)	2(40%)
Total (No. 56)	43(76.8%)	35(62.5%)	32(57.1%)	18(32.1%)	22(39.3%)	29(51.8%)	11(19.6%)

*IW: Impacted wisdom

Table 3: Prevalence of Vital Signs Associated with IW among Investigated Patients

Cases Age yrs. (No.) Site of impaction	Septic S.T.No. (%)	Lymphadenitis No. (%)	Fever No. (%)
18-20yrs. (11) Uni.	7(63.6%)	9(81.8%)	8(72.7%)
18-20yrs. (4) Bi.	2(50%)	4(100%)	3(75%)
21-23yrs. (18) Uni.	9(50%)	11(61.1%)	13(72.2%)
21-23yrs. (9) Bi.	5(55.6%)	9(100%)	5(55.6%)
24-26yrs. (9) Uni.	4(44.4%)	7(77.8%)	5(55.6%)
24-26yrs. (5) Bi.	4(80%)	3(60%)	3(60%)
Total (No. 56)	31(55.4%)	43(76.8%)	37(66.1%)

*IW: Impacted wisdom, S.T: Sore Throat

Table 4: Prevalence of Aerobic and Facultative Anaerobic Bacteria Associated with IW

Cases Age yrs. (No.) Site of impaction	*Staph. aureus* No. (%)	CNS No. (%)	*Strept. viridans* No. (%)	*Strept. mutans* No. (%)	*Strept. pyogenes* No. (%)	*Strept. pneumoniae* No. (%)	*Haemophilus Spp.* No. (%)	*Corynebacterium Spp.* No. (%)	*Pseudomonas Spp.* No. (%)	*E. coli* No. (%)
18-20yrs. (11) Uni.	3(27.3%)	5(45.5%)	10(91%)	6(54.5%)	2(18.2%)	3(27.3%)	6(54.5%)	7(63.6%)	1(9.1%)	2(18.2%)
18-20yrs. (4x2=8) Bi.	2(25%)	4(50%)	7(87.5%)	5(62.5%)	1(12.5%)	2(25%)	5(62.5%)	5(62.5%)	1(12.5%)	2(25%)
21-23yrs. (18) Uni.	4(22.2%)	8(44.4%)	16(88.9%)	9(50%)	3(16.7%)	4(22.2%)	10(55.6%)	11(61.1%)	2(11.1%)	4(22.2%)
21-23yrs.(9x2=18) Bi.	5(27.8%)	9(50%)	17(94.4%)	9(50%)	3(16.7%)	4(22.2%)	10(55.6%)	10(55.6%)	2(11.1%)	5(27.8%)
24-26yrs. (9) Uni.	2(22.2%)	4(44.4%)	8(88.9%)	5(55.6%)	1(11.1%)	2(22.2%)	5(55.6%)	6(66.7%)	1(11.1%)	2(22.2%)
24-26yrs.(5x2=10) Bi.	3(30%)	4(40%)	9(90%)	5(50%)	1(10%)	2(20%)	6(60%)	6(60%)	1(10%)	2(20%)
Total (No. 74)	19(25.7%)	34(45.9%)	67(90.5%)	39(52.7%)	11(14.9%)	17(23%)	42(56.8%)	45(60.8%)	8(10.8%)	17(23%)

*IW: Impacted wisdom, CNS: coagulase negative *Staph.* spp.: species

Table 5: Prevalence of Anaerobic Bacteria Associated with IW

Cases Age yrs. (No.) Site of impaction	*Prevotella Spp.* No. (%)	*Fusobacterium Spp.* No. (%)	*Actinomyces Spp.* No. (%)	*Bacteriods Spp.* No. (%)	*Campylobacter Spp.* No. (%)	*Lactobacillus Spp.* No. (%)	*Clostridium Spp.* No. (%)
18-20yrs. (11) Uni.	11(100%)	10(90.9%)	8(72.3%)	8(72.3%)	6(54.5%)	7(63.6%)	4(36.4%)
18-20yrs. (4x2=8) Bi.	8(100%)	7(87.5%)	6(75%)	6(75%)	4(50%)	5(62.5%)	3(37.5%)
21-23yrs. (18) Uni.	17(94.4%)	16(88.9%)	15(83.3%)	15(83.3%)	9(50%)	13(72.2%)	8(44.4%)
21-23yrs. (9x2=18) Bi.	18(100%)	17(94.4%)	16(88.9%)	15(83.3%)	10(55.6%)	14(77.8%)	8(44.4%)
24-26yrs. (9) Uni.	9(100%)	8(88.9%)	7(77.8%)	8(88.9%)	5(55.6%)	6(66.7%)	4(44.4%)
24-26yrs. (5x2=10) Bi.	10(100%)	9(90%)	8(80%)	8(80%)	6(60%)	7(70%)	4(40%)
Total (No. 74)	73(98.6%)	67(90.5%)	60(81.1%)	60(81.1%)	40(54%)	52(70.3%)	31(41.9%)

*IW: Impacted wisdom, spp.: species

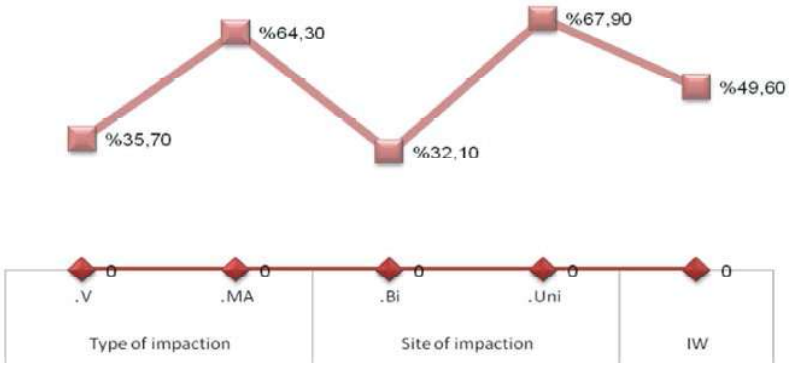

Diagram 1: Prevalence of IW among Complained Students Visiting Outpatient Clinic

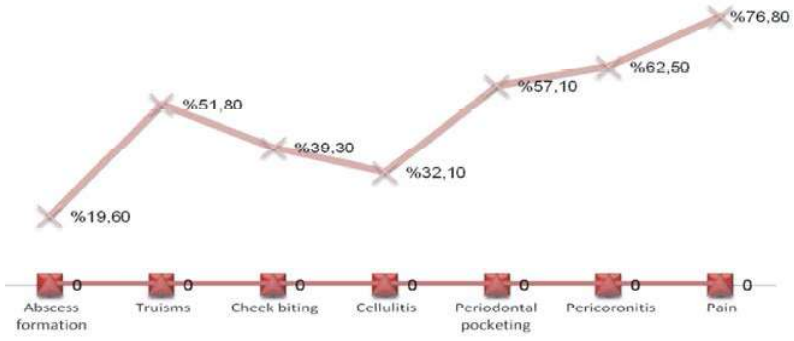

Diagram 2: Prevalence of Local Dental Signs Associated with IW among Investigated Patients

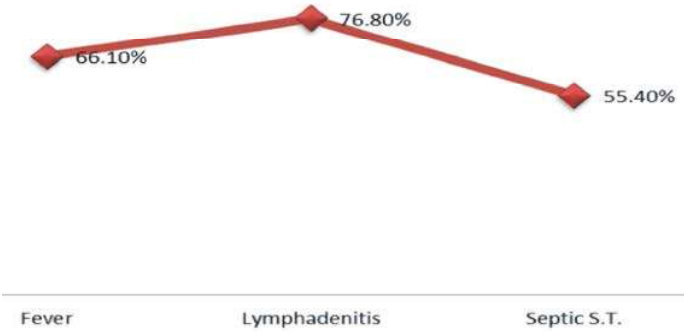

Diagram 3: Prevalence of Vital Signs Associated with IW among Investigated Patients

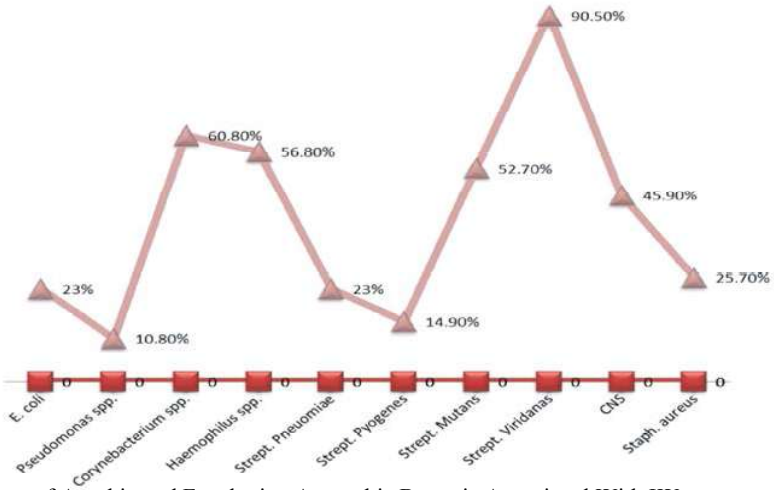

Diagram 4: Prevalence of Aerobic and Facultative Anaerobic Bacteria Associated With IW

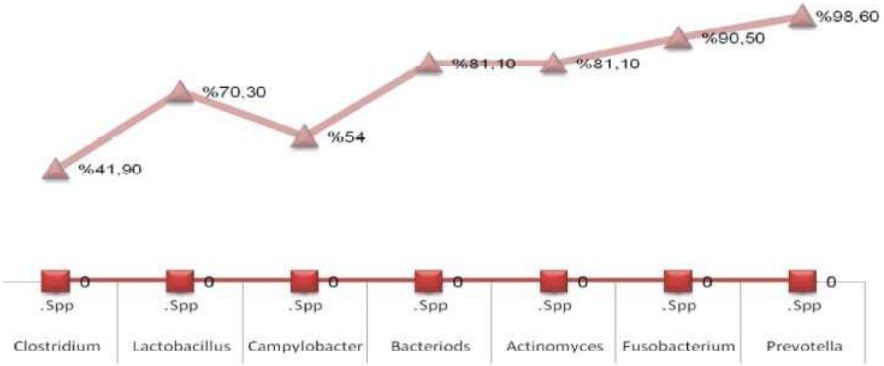

Diagram 5: Prevalence of Anaerobic Bacteria Associated with IW

Strept. pneumoniae, E. coli, Strept. pyogenes and Pseudomonas Spp. showed prevalence of 90.5, 60.8, 56.8, 52.7, 45.9, 25.7, 23, 33, 14.9 and 10.8% respectively. The distribution of the isolates in highest percentage according the age grade and site of impaction was as follow, *Strept. Viridans* (94.4%), in grade (21-23yrs.) (Bi.) and *Corynebacterium spp*. *Haemophilus Spp.* and *Strept. mutans* in (62.5%) (18-20yrs.) (Bi.). *Strept. viridians* (91%) in (18-20yrs.) (Uni.) and *Corynebacterium spp*. (66.7%) in (24-26yrs.) (Uni.).

Table (5) and diagram (5) show the prevalence of anaerobic bacteria associated with IW, the isolates were

arranged as follow *Prevotella spp. Fusobacterium spp. Actinomyces spp. Bacteroides spp. Lactobacillus spp. Campylobacter spp. and Clostridium spp.* 98.6, 90.5, 81.1, 81.1, 70.3, 54 and 41.9% respectively. The Highest isolates from each spp. were recorded according to age grade and site of impaction, *Prevotella spp.* 100% in all age grades and impaction sites except (21-23yrs.) (Uni.), *Fusobacterium spp*. 94.4% (21-23yrs.) (Bi.), *Actinomyces spp*. 88.9% (21-23yrs.) (Bi.), *Bacteroides spp*. 88.9% (24-26yrs.) (Uni.), *Lactobacillus Spp*. 77.8% (21-23yrs.) (Bi.), *Campylobacter spp.* 60% (24-26yrs.) (Bi.) and *Clostridium spp*. 44.4% (21-23yrs.) (Bi.) and (21-23 and 24-26yrs.) (Uni.).

DISCUSSION

The results of the present study confirmed that, the majority of IW are diagnosed and dissipated during the second and third decades of life. The incidence of IW was 56/113 (49.6%) of complained patients, although slightly higher, a comparatively low incidence of patients with IW and displaced lower third molars has been observed among Singapore Chinese dental patients and in another KSA population [43-46]. The incidence of IW in three age grades (18-20yrs.), (21-23yrs.) and (24-26yrs.) was 46.9, 57.4 and 41.2 %, respectively. The incidence of IW at sites (Uni. and Bi.) was 67.9 and 32.1%, respectively. According to position of IW (MA. and V.) the incidence was 64.3 and 35.7%, respectively. More than 50% of patients were aged (21-23yrs.). This may reflect the increased dental awareness in this group of patients, who were provided with free dental care services by the University clinic at Taif, during their university study years. However, the relatively high proportion of patients in their third decade may also have increased the overall prevalence of IW. The commonest type of impaction was the MA 33.4% [45, 19-21].

The most common complaint were pain 76.8%, pericoronitis 62.5%, periodontal pocketing 57.1%, trismus 51.8%, cheek biting 39.3%, cellulitis 32.1%, then abscess formation 19.6%. Pre-existing pericoronitis associated with the lower third molars may exacerbate the discomfort experienced by students, unless extraction or occlusal adjustment is attempted for the upper third molars. Three quarters of patients had problems on one side only (Uni.) 67.9% and the two most common complaints were pain and swelling, which were related to pericoronitis, as it was previously reported that pain is the most frequent symptom associated with impacted wisdom. Regarding the general physical signs, the prevalence of vital signs associated with IW was arranged as lymphadenitis 76.8%, fever 66.1% and septic S.T. 55.4% [22, 38, 46-48]. The inflamed regional lymph nodes was the first common sign detected among the patients, represented 76.8% and third was septic S.T. 55.5%, as it was stated previously. Fever is one of the characterizing features of the acute form of pericoronitis, also severe pain, which is referred to adjacent areas, causing loss of sleep, swelling of the pericoronal tissues, discharge of pus, trismus, regional lymphadenopathy, pain on swallowing, pyrexia and in some cases spread of the infection to adjacent tissues paces [49]. Patients with chronic pericoronitis complain of a dull pain or mild discomfort lasting a 1-2days, with remission lasting many months. They may also complain of a bad taste, bad breath or halitosis and loss of appetite [50].

The prevalence of aerobic and facultative anaerobic bacteria (10 types) associated with IW causing pericoronitis and accompanying S.T. was determined as 90.5, 60.8, 56.8, 52.7, 45.9, 25.7, 23, 33, 14.9 and 10.8% respectively for *Strept. Viridans, Corynebacterium spp. Haemophilus spp. Strept. mutans,* CNS*, Staph. aureus, Strept. pneumoniae, E. coli, Strept. Pyogenes* and *Pseudomonas spp*. The prevalence of 7 anaerobic bacterial 7 types associated with IW was as follow; *Prevotella spp. Fusobacterium spp. Actinomyces spp. Bacteroides spp. Lactobacillus spp. Campylobacter spp. and Clostridium spp.* as 98.6, 90.5, 81.1, 81.1, 70.3, 54 and 41.9%, respectively. The results showed 17 bacterial species were isolated from mandibular third molars with pericoronitis. The patients had dental and periodontal side effects of IW. The only oral infection focus recorded was the pericoronitis, hence it may be supposed that the pericoronitis bacteria detected indeed had originated from those foci to the other parts of the oral cavity. Aggregated bacteria *Actinomyces spp.*5%, *Prevotella intermedia* 35%, *Prevotella nigrescens* 35% were detected [27]. Anaerobic bacteria were present as *Clostridium spp*. whereas *Corynebacterium spp.* and *Lactobacillus spp.* were more common in pericoronal pocket samples. Many species could be isolated simultaneously from third molars [28, 51]. The isolated species were belonging to the normal oral flora, also act as pathogens if predisposing factors or conditions prevail, disturbance of the microbial balance and disruption of mucosal barriers by spontaneous or induced trauma (20, 52). 17different kinds of bacteria were detected in pericoronitis, or oral samples and some of these microbes

are obligatory anaerobic bacteria [29, 30, 52]. Dental plaque provides the medium for growth of bacteria, mostly Gram-positive organisms [31, 32, 53]. Facultative anaerobic *Strept. spp.* are the most frequent on oral and palatal mucosa and crypts of the tongue [30, 52]. Gram-positive *spp.* provide adhesion receptors for the obligatory anaerobic Gram-negative *spp.* normally found in periodontal pockets and on various oral surfaces, such as *Bacteroides spp.* [35, 36]. Same bacterial *spp.* can be found concomitantly (e.g. pericoronal pockets of lower third molars) because highly contaminated saliva flows freely between anatomically close sites.

The pathogens of pericoronitis were mainly gram-negative anaerobic microorganisms [7, 22, 28-30]. Bacterial *spp.* has been suggested as pathogens of periodontal disease and pericoronitis are part of the indigenous oral flora, which predominantly comprises Gram negative anaerobic rods [38, 43]. IW is considered as the predominant dental health problem certainly in age (18-26yrs.). IW has special sites and types which differe in the creating complications. The most dental complications were pain, pericoronitis, periodontal pocking, whereas accompanied vital signs were septic T.S. lymphadenitis and fever. Predisposing factors can help for changing oral micro flora into pathogenic organisms which create the infections in IW and affect oral hygiene.

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