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Mário dos Anjos Neto Filho
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MUSCULOSKELETAL DISORDERS IN DENTAL SURGEONS

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ABSTRACT

Research has shown that many cases of diseases interfere with the health of workers in various types of business activities, and its etiology the Work-Related Musculoskeletal Disorders (WMSDS). The Dental Surgeons because of their professional activities are professionals likely to develop musculoskeletal disorders, which added to various harmful factors could expose them to develop some kind of Work-Related Musculoskeletal Disorders. Purpose is to achieve with this article verify the indicative signs of Work-Related Musculoskeletal Disorders and its prevalence related to the work of Dental Surgeons seeking to prove the high probability of Dental Surgeons develop this pathology; evaluate risk behaviors, as well as protective measures listed. To achieve the goal was made a literature review and through field research a questionnaire to thirty Dental Surgeons working in the municipalities of Mendes and Vassouras / RJ, seeking to verify the situation the same with regard to Work-Related Musculoskeletal Disorders.

KEYWORDS: Dental Surgeons, work-related musculoskeletal disorders, Professional practice.

1. INTRODUCTION

It is found that the relationship between work, health and disease has been known since the dawn of human history, being represented through the arts, history, philosophy and literature. However, the authors comment that is relatively recent development of studies that show the damage to physical and mental health of health professionals generated by occupational factors¹.

Dentistry has been considered a "stressful" profession and is often associated with health problems, both physical and psychic order. Systematic studies on musculoskeletal disorders in Dental Surgeons have been made since the 1950s, and are responsible for the first proposals for changes in the dental work process, including the change in the orthostatic position working for the sitting position².

The Dental Surgeons are among the workers most affected by musculoskeletal disorders due to physical origin

factors, chemical, ergonomic biological, mechanical and psychological, in addition to several transformations occurring in the dental labor market and who are bringing negative consequences for the health of this professional class^{3,4}.

Contemporary researchers have shown that activities that require physical exertion combined with mental efforts can cause damage to the worker's health. This fact occurs by direct influence of repetitive movements, rapid, continuous and / or strenuous tasks, beyond the physical and the organization of work environment⁵.

In Brazil, the nomenclature initially adopted for musculoskeletal disorders related to work was Occupational Tenosynovitis and was used by many authors to appointed pain or discomfort in the upper limbs related to work activities. Currently, there are several names for this set of diseases that affect the musculoskeletal system structures, among which is the term Cumulative Trauma Disorder (CTD), Repetitive Strain Injury (RSI) and Work-Related Musculoskeletal Disorders (MSDs)^{6,7}.

The MSDs affect workers from various fields such as, Dental Surgeons, laboratory technicians, writers, typists, among others, which are subjected to long working hours with constant efforts, postures and without breaks rest⁸.

The MSDs have an insidious onset and slow, this way, as the disease progresses and begin to appear fuzzy or unspecific pain in certain body part, the individual often becomes avoid certain movements and modify others, usually by abolishing some activities to minimize pain. Thus, through the experience of this situation the worker will adopt, definitively, postures that will contribute to the development of disease^{9,10}.

The RSI and MSDs have been identified with the same characteristics, which cover several pathologies affecting mainly the upper limbs, but more serious due to the masking process, becoming a problem public health. So, today, are the disorders caused by work more often in the country, killing much of the working population, depriving individuals of the various branches of their health activity and

work capacity^{5,11}.

Dental Surgeons, to achieve the best results, take positions that guarantee them the best of the operative field visibility, accuracy and mobility of hands, including working with the arms raised and without support; such conditions exacerbate the musculoskeletal system disorders. Thus, this search for excellence just becoming more important for the professional to care for their own health, contributing to the development of various pathological changes^{12,13}. Another factor that should be highlighted, for contributing to poor posture during the dental procedure, even though modern and sophisticated equipment is used, is the field of work that, in most cases, is below the eye level of the Dental Surgeon, what makes the professional stay with the head tilted forward with rounded shoulders, such a position can cause weakening and stretching the muscles of the shoulder blades (trapezius, scapula levator, major and minor rhomboids, anterior serratus, minor pectoralis). The scapulas tend to move away from the spine, leading to a posture of rounded shoulders. Furthermore, scalene, sternocleidomastoid and pectoralis become short and tight by pulling the head forward. Ligaments and muscles will adapt to this new situation, making the correct posture becomes uncomfortable. Improper posture of the head and shoulders also increases the force on the upper cervical muscles (upper trapezius and scapula levator) and on the vertebral discs, which may result in ischemia and muscle pain, there is also risk of degeneration of the discs^{14,15,16}.

Since the physical effort required during dental practice is mild, repeated at high speed by the hands and fingers. However, at the same time requires an improper posture and static overloading the remaining segments, which occurs when a limb is maintained, with little or no movement, a position which deviates from the neutral zone of the biomechanical forces relationship, or against gravity, or when the muscular activity cannot revert to zero⁷.

The changes in traditional dentistry labor market made the stressful profession, contributing to the emergence of diseases such as MSDs, health professionals. These changes are caused by the current healthcare system in Brazil, popularity of group dental systems, opening new faculties in the area, increasing the supply of professionals in the labor market and decreased purchasing power. Together, these factors lead the practitioner to an increase in their working hours, exceeding the limits of the body, bringing as a result of a musculoskeletal overload and/ or emotional stress^{10,17,18}.

In order to prevent these problems, we see that the correct posture to the Dental Surgeon during the performance of their duties, is sitting as far back as possible in his seat, looking for a vertical and symmetrical position of the torso, keeping your arms at and next to the trunk. The angle between the thigh and leg to be about 110°, with legs slightly apart from one another. Regarding the visual field,

this should be at a height that allows the formation of an angle of 10° to 25° between the forearm and the ground. The eyes of the Dental Surgeon should meet perpendicular to the operative field, maintaining a distance 35 to 40 centimeters. The chair patient must meet two main requirements: accommodating the patient in a comfortable position, so that it becomes relaxed during treatment and; allow the Dental Surgeon performs his work ergonomically correct way. With regard to the work material, the tools should be at hand, above the waist and below the shoulders level, avoiding flexion and extension movements that favor the development of MSDs. Finally, your back should be supported in the lumbar back of the chair, the height of the upper portion of the pelvis, allowing an upright back^{19,20,21,22,23}.

This article is justified since dentistry as a profession has evolved greatly, especially in recent decades, so the intense practice of dental services provides a very great physical wear to the Dental Surgeon, making it very vulnerable to various musculoskeletal problems, as MSDs. This study aims to determine the indicative signs of MSDs and their prevalence related to the work of Dental Surgeons seeking to prove the high probability of Dental Surgeons develop this pathology; evaluate the risk of conduits, as well as protective measures indicated²⁴.

2. MATERIAL AND METHODS

This is a descriptive epidemiological study aimed to identify the prevalence of musculoskeletal pain in Dental Surgeons who work in Mendes municipalities, Brooms and Barra do Pirai / RJ. The survey was conducted after approval committee of ethics and human research at the University Severino Sombra under number 1.311.439.

The sample size calculation was based on the mean number of Dental Surgeons that are active in the three cities proposed. Established a total sample of 30 distributed Dental Surgeons in proportion to the three cities.

The inclusion criterion was being Dental Surgeon active and live in the cities of Mendes, Vassouras and Barra do Pirai / RJ. The exclusion criterion was not sign the Informed Consent.

The instrument adopted was the "Nordic Questionnaire Musculoskeletal," Portuguese version of Cristina Carvalho Mesquita. The questionnaire is divided into stages: first, it is considered the last 12 months, searching for whether the professional had any problems (such as pain, discomfort or numbness) in the following regions: neck, shoulder, elbow, wrist/ hands, thoracic region, lower back, hips/ thighs, knees, ankles/ feet. In the second stage there is during the last 12 months the respondent had to avoid their normal activities (work, housework or hobbies) because of problems in the above mentioned regions. In the third part there is the dental surgeon interviewed

had any problems in the last 7 days, in the regions mentioned above. It is a constituent part of the questionnaire a scale so that we can shall measure pain, ranging from index "no pain" to "maximum pain".

Initially, it was made an exploratory analysis of data for evidence of possible painful conditions caused by MSDs. Later, there was the descriptive statistics, with prevalence for the following variable: the signs and symptoms of musculoskeletal disorders through the valuation of pain/ discomfort. This analysis was used to check the local prevalence of pain related to the work of the respondents, as well as the time you are going through this discomfort (last twelve months and the last seven days) and the prevalence of pain. Data were condensed and analyzed using Stata version 8.2 software (Stata Corporation, College Station, United States) and SPSS 9.0.

3. RESULTS

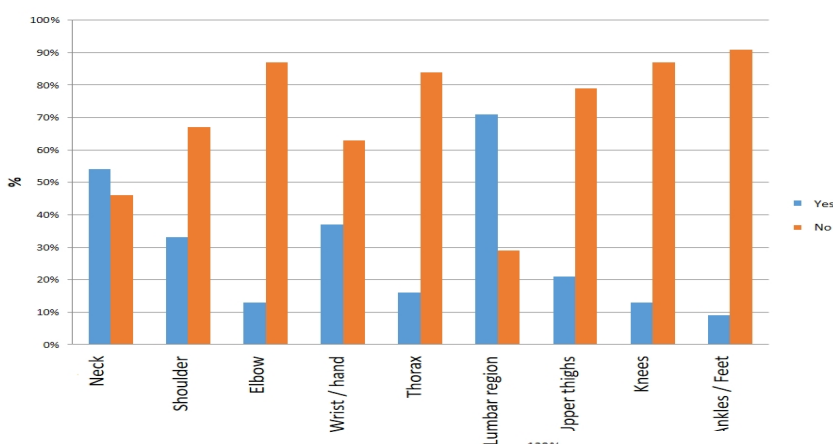


Figure 1. Prevalence of pain, discomfort and numbness in the last 12 months.

When the Dental Surgeons were asked about the prevalence of pain in the last twelve months, all professionals reported symptoms in any anatomical region, and the lower back was the most prevalent (70.8%), followed by the neck, wrists and hands, as can be given in Figure 1.

To be checked if the frequency of pain caused normal activities were affected in the last twelve months, 29.1% of respondents reported that frequent pain in the lower back caused had to avoid activities such as work, housework or pastimes, as can be seen in Figure 2.

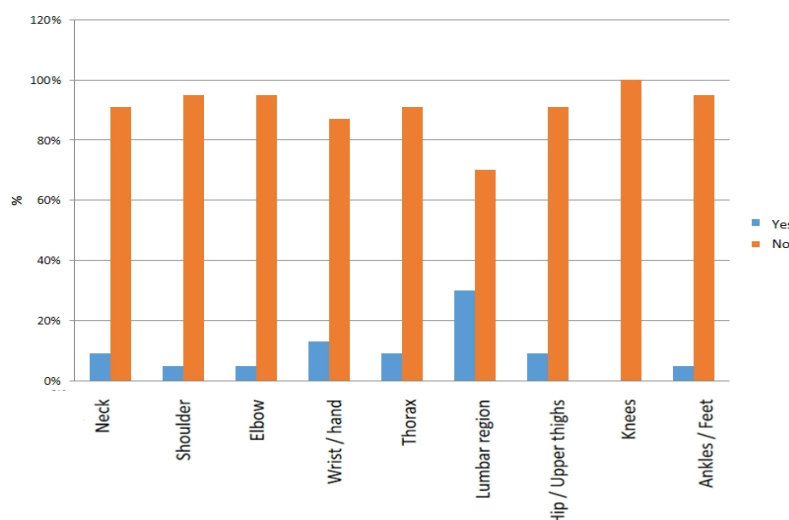


Figure 2. Avoid normal activities because of the frequency of pain in the last 12 months.

As regards the problems related to pain in the last seven days in the cited regions, it is observed that most respondents complained of pain in the neck (33.3%), followed by pain in the lower back (25%), as can be given in Figure 3.

It was found that none of the respondents pointed to be asymptomatic. It was also observed that the correlation, the Spearman test, time profession with the prevalence of musculoskeletal symptoms, there was no association between the variables ($p = 0.450$), ie, the appearance of pain symptoms was inherent the years of professional activity, this actually happens, as all professionals are interviewed in a high productivity period.

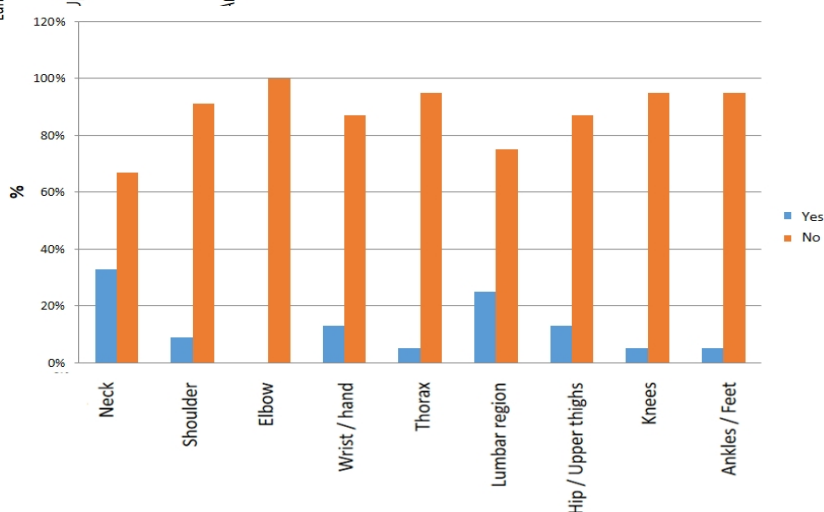


Figure 3. Problems presented in the last seven days.

As regards the intensity of the perceived pain can be seen in Table 1 that:

Table 1. Intensity of pain (n = 24).

Affected region	Pain level	Percentage
Neck	02	16.6%
	04	16.6%
	10	4.1%
	07	12.5%
	01	4.1%
Shoulder	02	8.3%
	06	8.3%
	07	4.1%
	10	4.1%
	04	4.1%
Elbow	06	4.1%
	05	4.1%
Wrist / hand	04	4.1%
	01	4.1%
	05	8.3%
	08	8.3%
	06	4.1%
Thorax	06	4.1%
	10	4.1%
	07	8.3%
Lumbar region	06	8.3%
	02	4.1%
	03	16.6%
	10	4.1%
	05	16.6%
	09	4.1%
	07	8.3%
Hips/ thighs	03	8.3%
	02	8.3%
	06	4.1%
Knees	03	4.1%
	05	4.1%
	06	4.1%
Ankles / feet	02	4.1%
	03	4.1%

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4. DISCUSSION

It appears that the Dental Surgeon's performance leads him to adopt postures considered as vicious side bends, crunches and extensions during the work, remaining a long sitting. Most often, the way that these positions are made may cause postural changes origin, for example,

scoliosis, lordosis and kyphosis. This statement is evident in this study as shown in Table 1^{1,8}.

Warns that human spine does not have a suitable bio-mechanical model to stay for long periods of sitting, standing, thus, a static posture associated with repetitive motion. Also found in their studies that the relevance, increasing of MSDs in morbidities frame that affect Dental Surgeons, along with the physiological changes that accompany them, may be related to the common practice of these professionals remain seated for long periods. The authors point out that this position generates a pressure increase in vertebral discs, leading to degenerative changes in the spine. The result of these researchers above comes directly against the results of this study and shown in Figure 1^{2,14}.

Discusses that among the Dental Surgeons, the MSDs are mainly due to the physical and visual effort, shifts and movements required for the task to be performed, as well as body position adopted for its realization. They are also often caused because of the use of rotating instruments, since the constant vibration caused by micro motors can propagate by tendons, muscles and bones generating micro lesions.^{25,26}

Psychological factors influence the occurrence of poor posture and ergonomic failures during dental service. The dental surgeons are very concerned about the quality of their work and often do not care about posture and ergonomics, as the realization of an inadequate or defective work causes serious damage to the patient and can also adversely affect the image of the professional and in some cases their own dental profession to society²⁷.

The rise of MSDs is directly linked to the execution of professional work in awkward postures with repetitive movements associated with long working hours. In this sense, the authors put the Dental Surgeons and professionals that most move away from work for incapacity permanent has rary^{4, 14, 25}. The results of the survey for us comes directly against this statement.

The study is evaluating the frequency of MSDs among Dental Surgeons and showed a higher incidence of low back pain among professionals who work mostly sitting than in those who alternate the calls in the sitting position and standing, which led the authors to suggest alternating position in order to avoid this type of damage. However, they found in their studies no significant difference in the prevalence of symptoms among professionals working only sitting (61% with neck pain, 33.3% with shoulder pain, and 88.9% with back pain) those that alternated its position during patient care (58% with neck pain, 52% with shoulder pain and 76% with back pain). This insignificant difference in the results of this study, it was observed by us in our study as can be verified in one table data^{9,22}.

The study, in Caxias do Sul / RS, in 2008, noted that 98% of Dental Surgeons surveyed reported feeling some

pain in the last twelve months in any part of the body. Since, such professionals, the prevalence of symptoms was more musculoskeletal present when compared to the general population (62%)²³.

In this study it was observed that the regions most painful symptoms were lower back (70.8%) followed by cervical region (54.1%), wrists and hands (37.5%), while he was in line with other studies also point to the high frequency of occurrences of pain and discomfort in different areas of the upper body^{2,8,14,25}. However, in another study, it was found that the most affected regions were the cervical (79%), lumbar (73%) and shoulders (70%)²¹.

The studies focused on the age and location of the body where the most MSDs affect the dental surgeon revealed that professionals aged greater than thirty-eight years of age had a higher frequency of pain / discomfort in the neck (44.4 %); shoulders (38.9%), dorsal region (33.3%), arms (27.8%), forearm and lower limbs (22.2%). Already in professionals aged less than 38 years, the highest frequencies were the lower back (47.6%), wrist / hands / fingers (33.3%) and hip (9.5%)⁴.

The research carried out using the cross-sectional epidemiological method to seek evidence of the relationship between the tasks performed by the Dental Surgeon and the RSI and MSDs, revealed the presence of a statistically significant association between the two sexes and conditions. For the authors, women had more injuries than males in proportion, 67.5% of female dental surgeons and 51% of men had symptoms of musculoskeletal pain, and shoulder/ arm (39.4%), wrist/ hand (18.3%) and neck (17.2%) are the most affected regions⁵.

The work environment and musculoskeletal disorders seem to vary by position and gender, corroborating comas ideas was perceived⁵. The prevalence of 94% among women and 86% among men²⁸. In another study there was a report of more pain for women compared to men²⁹. This fact may be because women are more prone to emotional stress caused by several factors: a double shift because, culturally, women beyond their professional performance have to perform household chores, taking care of children, take them to school, among others. Another fact that can be detached and the use of contraceptives and hormonal changes during the menstrual cycle. Biologically, women's musculoskeletal development is inferior to men, women have fewer muscle fibers and are less able to store and convert glycogen into useful energy, and has the low-density and size of bones⁵.

The most commonly found diseases are degeneration of the intervertebral discs of the cervical and lumbar regions of the spine, bursitis, inflammation of the tendon sheaths and arthritis of the hands. The evidence of any injury can be a feeling of heaviness, numbness, pain in specific movement, loss of sensation, tingling, widespread pain at rest, loss of strength and swelling¹.

5. CONCLUSION

There was a high prevalence of MSDs related work Dental Surgeons Mendes municipalities, Brooms and Barra do Pirai - RJ. There was a high prevalence of musculoskeletal pain, and the lumbar regions, followed by the neck, wrists and hands most affected. It was shown that even before the data presented, the carrying out of further studies on the MSDs that affect this professional category is required. Before the survey results suggest that the Dental Surgeons need information about the mechanisms that contribute to the development of MSDs, so they can choose the best ergonomic equipment, and become aware of the importance of physical exercise to improve the quality life. Without this knowledge dentistry of professionals do not take the basic measures to prevent injuries and cannot thus avoid their incapacitation for the profession.

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GINGIVAL DISEASE IN ADOLESCENTS RELATED TO PUBERTAL STAGES AND NUTRITIONAL STATUS

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ABSTRACT

The relationship between gingival disease in adolescents and pubertal stages is not clear. The aim of this study is evaluate whether there is a relationship between the prevalence of gingival disease in adolescents and the different stages of pubertal development as well as nutritional status. The study group was comprised of 158 adolescents ages 10 – 19 years. Measures of pubertal stages were based on physical examinations. The World Health Organization (WHO) community periodontal index of treatment needs – (CPITN) was used to assess levels of periodontal condition and treatment needs. The Body Mass Index was assessed by nutritionists from our Division and then the subjects were classified according to nutritional status by the WHO classification. According to CPITN scores, 17.72% of the adolescents scored 0 (healthy), 48.73% of the adolescents scored 1 (bleeding after probing) and 33.55% scored 2 (presence of calculus). There was no statistically significant difference among Tanner stages in relation to CPITN scores ($p=0.130$). Although there is biological plausibility to the occurrence of these associations, there is a lack of epidemiological data to support them. The clarification of this issue is important in the clinical practice of pediatric dentists.

KEYWORDS: Adolescent, body mass index, gingival diseases, obesity, puberty.

1. INTRODUCTION

Although there are a large number of pathological conditions that affect the periodontal tissues, the two most prevalent forms of the disease are plaque-associated chronic gingivitis and periodontitis. Gingivitis affects more than 70% of children older than 7 years of age¹. Chronic periodontitis affects a small proportion of children and adolescents, but the prevalence and severity increase significantly with age².

It has been reported that increased levels of sex hormones, estrogens and progestins during pregnancy, puberty or among women taking oral contraceptives may induce endothelial damage, increase vascular permeability and influence granulation tissue

formation³.

Saito *et al.* (2001) studied the relationship between obesity and visceral fat accumulation and periodontitis⁴. They found that both are risk factors for periodontitis. According to the study of Saito *et al.* (2005) there is biological plausibility that gives meaning to the association between obesity and periodontitis⁵. Petti *et al.* (2000) studied the association between nutritional variables and gingival health and did not find statistically significant differences between overweight/obesity and gingivitis⁶.

Puberty is characterized by several physical and hormonal changes. A classification system was developed based on these pubertal changes⁷. Sexual maturity ratings include breast development in females, genital development in males and pubic hair development in both males and females. According to this classification the pubertal stages are B1 through B5 and P1 through P5 in girls; G1 through G5 and P1 through P5 in boys.

Rapkin *et al.* (2006) noted that a child's age may be less important than his/her pubertal stage in both clinical and research settings⁸. This study found a high correlation between pubertal stages and circulating levels of estradiol and follicle stimulating hormone (FSH) primarily on epidemiological studies and concluded that Tanner pubertal stages are as reliable as the evaluation of FSH levels when these are unavailable.

The aim of this study was to evaluate whether there is a relationship between the prevalence of gingival disease in adolescents and the different stages of pubertal development as well as in relation to nutritional status.

2. MATERIAL AND METHODS

This study was done at the Federal University of São Paulo, in São Paulo, Brazil, and was approved by the Institutional Ethics Review Board (protocol number 1048/09). Informed consent was obtained from all subjects and their parents or guardians prior to

participation in the study. The subjects of the study were 158 adolescents (ages 10 - 19 years) referred to our clinic of Adolescent Medicine of the Department of Pediatrics (School of Medicine, Federal University of São Paulo). The Adolescent Clinic is part of the Outpatient Pediatric Clinic and provides medical services for adolescents between the ages of 10 - 19 years. The sample consisted of adolescents undergoing routine check-ups in our clinic. The number of adolescents enrolled in our clinic determined our sampling size, characterizing the choice process of the sampling unit as a convenience criterion for the study⁹.

The sample size calculation was performed. The calculation of sample size for the study of association of gum disease in adolescents and the different stages of pubertal development as well as in relation to nutritional status used a prevalence-based study of an Epidemiological Survey on Oral Health held in São Paulo in 2008-2009¹⁰. The study evaluated three age groups: (5, 12 and 15-19). Prevalence of gingivitis in two groups: 12-year-old and 15 to 19-year-old adolescents (60% and 63.5%, respectively) was used to calculate the sample size with a statistical power of 80%. The sample number of adolescents in this study was, respectively: 4249 (12 years) and 2858 (15-19 years) and the World Health Organization (WHO) community periodontal index of treatment needs – CPITN¹¹ was used to assess levels of periodontal condition and treatment needs. The formula for required sample size when testing proportions was used to analyze the data¹², taking into account a significance level of $p < 0.05$. The sample size (N) necessary for this study to have statistical power was determined to be 157.

Measures of pubertal stages were assessed based on physical examinations by physicians from our Division. The adolescents were classified into three subgroups, according to Tanner stages^{13,14} where G indicates the genital development in males and B, breast development in females:

Subgroup 1 (Stages G1 and G2 - B1): before the growth spurt

Subgroup 2 (Stages G3 and G4 - B2, B3, and B4): growth spurt period

Subgroup 3 (Stage G5 - B5): end of the growth spurt

The gonadal stage was chosen for the classification, since pubic hair growth, one of the characteristics of the Tanner stages is governed by androgenic hormones and not by sexual hormones.

The Body Mass Index ($BMI = \text{weight}/\text{height}^2$) was assessed by nutritionists from our Division and the subjects were then classified according to nutritional status (eutrophic, overweight and obese) by the WHO classification¹⁵. None of the participants were underweight.

Exclusion criteria included systemic disorders that could predispose to gingival disease such as asthma and diabetes, hormonal replacement therapy, immune deficiency as well as smoking¹⁶. To be included in this

study, the adolescents were required to have all of the six index teeth (maxillary right and left permanent molar, mandibular right and left permanent molar, maxillary right central incisor and mandibular left central incisor) present and with preserved structure. Adolescents that were undergoing any kind of orthodontic treatment were also excluded from our study.

Four outpatient dentists were trained to perform the examination.

The World Health Organization (WHO) community periodontal index of treatment needs (CPITN)¹¹ was used to assess levels of periodontal condition and treatment needs. A dental mirror and the WHO periodontal probe -No. 621, with ball end 0.5 mm¹⁷ were used to determine the bleeding response, the probing depth and the presence of calculus.

Each sextant was assigned a code number and the condition of the most affected site in that sextant was recorded. This method establishes that for subjects under 20 years of age, only six index teeth (maxillary right and left permanent molar, mandibular right and left permanent molar, maxillary right central incisor and mandibular left central incisor) should be evaluated. This process prevents mistakenly scoring the deepened sulci associated with eruption in this age group as periodontal pockets. For the same reason, when children under 15 years of age were examined, only bleeding and calculus were recorded. In our sample 42 adolescents were older than 15-year-old and none of them presented periodontal pockets. Thus, we scored all the subjects using with the following criteria:

CPITN 0 = healthy periodontal tissue

CPITN 1 = bleeding after careful probing

CPITN 2 = supra or subgingival calculus

Note that CPITN 1 and CPITN 2 are considered signs of gingivitis.

O'Leary's method was used to access the biofilm or plaque index¹⁸. The biofilm disclosing agent used was 5% erythrosine on the buccal, mesial, distal, lingual or palatal and occlusal/incisal surface. O'Leary's Plaque Index is based on the visible continuous plaque along the gingival margin. After staining, the percentage of tooth surfaces exhibiting stained plaque was calculated (number of stained surface/number of dental face x 100).

The data were evaluated using Excel (Microsoft®). Statistical evaluation of the data collected was performed with the use of SAS version 8.2 software. The groups were compared using multivariate logistic regression analysis, controlling for plaque index. The Kruskal-Wallis test was used to compare the continuous variables. The agreement between the examiners was calculated and Kappa-values indicated good to excellent (0.579–1.000) reliability, with intraclass correlation coefficient values ranging from 0.757 (CI 95%: 0.507; 0.922) to 0.899 (CI 95%: 0.763; 0.970), indicating strong agreement. The significance level used was 0.05^{19,20}.

3. RESULTS

In this study, 48.10% of the adolescents in the sample were male and 51.90% were female. There were 35 adolescents ages 10-12 years (22.15%), 81 adolescents ages 13-14 years (51.27%) and 42 adolescents ages 15-19 years (26.58%).

Table 1. Plaque index compared to CPITN (Community Periodontal Index of treatment Needs) in all adolescents of the sample.

CPITN	N	Mean	Std Deviation	Minimum	Median	Maximum	p-value
Healthy	28	26.49	16.76	10.00	24.64	100.00	0.002
Bleeding	77	31.32	21.41	0.71	25.00	100.00	
Calculus	53	38.57 [†]	17.89	5.00	35.71	100.00	

Kruskal-Wallis Test: $p = *p < 0.05$ Healthy to Calculus and $p = †p < 0.05$ Bleeding to Calculus CPITN is the dependent variable and IP is the independent variable.

Table 2. Distribution of CPITN (Community Periodontal Index of Treatment Needs) by nutritional status in male and female adolescents controlling for plaque index.

Male adolescents				
	Eutrophic	Overweight	Obese	Total
Healthy	3 (10.00)	3 (20.00)	3 (9.68)	9
Bleeding	16 (53.33)	8 (53.33)	16 (51.61)	40
Calculus	11 (36.67)	4 (26.67)	12 (38.71)	27
Total	30	15	31	76
Female adolescents				
Healthy	7 (25.00)	6 (33.33)	6 (16.67)	19
Bleeding	14 (50.00)	4 (22.22)	19 (52.78)	37
Calculus	7 (25.00)	8 (44.44)	11 (30.56)	26
Total	28	18	36	82

Logistic Regression Analysis (male adolescents): $p = 0.530$; $†$ logistic regression analysis (female adolescents): $p = 0.623$; $‡$ CPITN is the dependent variable and the nutritional status and IP are independent variables.

Table 3. Distribution of CPITN (Community Periodontal Index of Treatment Needs) by Tanner stages subgroups in male and female adolescents controlling for plaque index.

Tanner	Subgroup 1	Subgroup 2	Subgroup 3	Total
Male adolescents				
Healthy	5 (17.24)	4 (12.90)	0 (0.0)	9
Bleeding	17 (58.62)	16 (51.61)	7 (43.75)	40
Calculus	7 (24.14)	11 (35.48)	9 (56.25)	27
Total	29	31	16	76
Female adolescents				
Healthy	1 (20.00)	11 (22.92)	7 (24.14)	19
Bleeding	2 (40.0)	25 (52.08)	10 (34.48)	37
Calculus	2 (40.0)	12 (25.00)	12 (41.38)	26
Total	5	48	29	82

* Logistic Regression Analysis (male adolescents): $p = 0.053$; $†$ Logistic Regression Analysis (female adolescents): $p = 0.714$; $‡$ CPITN is the dependent variable and Tanner stages subgroups and IP are independent variables.

According to the Tanner subgroups, 50.00% of the adolescents were in the growth spurt period.

There were no statistically significant differences in the CPITN scores of either male or female adolescents, when evaluating nutritional status (Table 2) or Tanner

stages (Table 3).

Regarding nutritional status distribution, 36.71% of subjects were eutrophic, 20.89% were overweight and 42.40% were obese; 48.73% of the adolescents had a CPITN score of 1 (bleeding after probing) and 33.55% had a CPITN score of 2 (presence of supra or subgingival calculus).

Evaluating all adolescents in the sample, without separating by gender, there was no statistically significant difference among Tanner stages in relation to CPITN scores ($p = 0.130$) and no statistically significant differences were found between the CPITN scores in relation to nutritional status ($p = 0.724$).

The Table 1 demonstrates that there was a statistically significant difference among the scores of CPITN in relation to plaque index, when comparing the calculus group to both the healthy and the bleeding groups.

4. DISCUSSION

The relationship between puberty and gingivitis has been discussed in several studies²¹⁻²³. To our knowledge, the only two published studies that have established a relationship between Tanner stages and gingivitis are the study of Delaney *et al.* (1986)²⁴ and the study of Mombeli *et al.* (1989)²¹, Hugoson *et al.* (1981)²² reported a low prevalence of gingivitis in pre-schoolers, followed by a gradual increase in prevalence reaching a peak around puberty²². Mombeli *et al.* (1989)²¹ followed pubertal development by evaluating Tanner stages, bone age and clinical gingival conditions in 42 adolescents ages 11-15 years in a 4-year longitudinal study and found highly significant trends of increase in bleeding scores in both boys and girls with the start of pubertal phase²¹. In 35% of cases, bleeding scores reached a peak value 1-5 years after the onset of pubertal development. Delaney *et al.* (1986)²⁴, found that significant changes in components of the microbiotic of the gingival crevice were associated with skeletal, sexual, dental and chronologic age of subjects²⁴. According to a review by Bimstein & Matsson (1999)²³, hormonal influence on the gingival tissues and the composition of the dental plaque are of particular relevance during puberty²³.

Our study revealed a statistically significant difference between plaque Index and CPITN scores in adolescents when comparing the calculus group to the healthy group and to the bleeding group. This demonstrates that there is a positive and significant association between plaque index and the presence of dental calculus.

According to Genco (1996)²⁵, although the importance of specific bacteria in the plaque has been highlighted, several investigators have reported that the quantity of plaque accumulation has weak, none, or negative association with periodontitis²⁵. However, several investigations have shown a close relationship

between the incidence of gingivitis and oral hygiene²⁶⁻²⁸.

When controlling for plaque index, there was no statistically significant difference between Tanner stages in adolescents and CPITN scores. A Brazilian epidemiologic study found that the prevalence of gingivitis in adolescents varies from 53.3% to 78.5%²⁹. In our study, the prevalence of gingivitis (CPITN scores 1 and 2) is 82.83%. The lack of statistical difference among subgroups of Tanner stages and CPITN scores can be explained by the fact that the increase in bleeding scores and gingivitis is a continuous process during puberty and peaks 1-5 years after the onset of pubertal development²¹ 73.42% of the adolescents in our study were between 10-14 years of age and 50.00% of the adolescents were in the growth spurt period. This makes it very difficult in a continuous process with wide individual variations to find differences between subgroups of Tanner stages, as they can reach a peak in gingivitis in a period around the growth spurt and this period can be superimposed among the subgroups. The clinical meaning of this finding is that the pediatric dentist should be aware of the age-dependent reactivity and hormonal influences on gingival tissues, particularly after the onset of puberty, in order to diagnose gingival inflammation that is out of proportion to age. Such a situation can be indicative of a high susceptibility to periodontal diseases. The importance of prevention, early diagnosis and treatment of periodontal diseases disease is high.

Obesity is increasing worldwide at an alarming rate and it has become a major public health problem in both developed and developing societies³⁰. A number of epidemiological studies have examined the association between obesity and periodontitis^{4,5,31-35}. Although some of the studies showed a strong positive association^{4,5,31}, others only observed moderate positive associations^{32,35}. It should be noted that obesity and other risk factors are rarely isolated causes of periodontitis³⁵.

Based on current knowledge, the adverse effects of obesity on the periodontium may be mediated through impaired glucose tolerance, dyslipidemia or increased levels of various bioactive substances secreted by adipose tissue³⁶.

Some studies have evaluated the relationship between body mass index (BMI) and periodontitis in young adults^{37,38}. Ekuni *et al.* (2008)³⁷ evaluated 618 Japanese students ages 18-24 years and found that BMI could be a potential risk factor for periodontitis among healthy young individuals³⁷. Sarlati *et al.* (2008)³⁸ examined the possible relationship between body weight and periodontal disease in a sample of young Iranians ages 18 to 34 years and found that overall and abdominal obesity were associated with the extent of periodontal disease³⁸. Al-Zahrani *et al.* (2003)³² showed a significant association between obesity and the prevalence of periodontal disease among

individuals ages 18-34 years and not in the middle-aged and older age groups³². One possible explanation is that the effect of obesity is diluted in the older age groups in the presence of stronger risk factors such as age. The influence of obesity on the periodontal status of older participants may be masked, since non-obese subjects would also develop periodontal disease as they age. It is important to point out that the prevalence of periodontitis reported in the World Health Organization Global Oral Health Data Bank for 15–19-year-old individuals is approximately 10%³⁹.

In our study, no significant difference was found in the CPITN scores in relation to nutritional status when controlling for plaque index. In our sample, the prevalence of obese (42.40%) or overweight adolescents (20.89%) was higher than that in the general population. The explanation for this may be that there is a specific outpatient center in our Division for obese adolescents. In addition, only 42 adolescents were older than 15 years of age and none of them had periodontal pockets. We, therefore, scored all the subjects as CPITN 0-2, which characterizes gingivitis, not periodontitis. The studies described in the literature^{37,38} do not relate obesity with gingivitis, but relate to periodontitis. As the prevalence of gingivitis in our study was very high, even though no significant difference between CPITN scores and the nutritional status of the adolescents was found; it is very important to remember that a change in periodontal tissue status that is due to metabolic changes associated with obesity might increase the extent and progression of periodontal disease later in life⁴⁰. Therefore, establishment of preventive programs for management of obesity might be an adjunctive approach to improving periodontal health³⁸ and since the prevalence of gingivitis in adolescents is very high, it is imperative to monitor these patients closely.

Although CPITN is not an index that discriminates degrees of gingival inflammation, since the gingival bleeding may be present with minor and severe inflammation, it is an objective index and less subject to Intra-observer variations, and is therefore widely used. In addition, CPITN is an index of choice for population surveys¹⁷.

There were no statistically significant differences in the prevalence of gingival disease in adolescents and the different stages of pubertal development or nutritional status. However, as the prevalence of gingivitis in adolescents is very high, pediatric dentists should be very closely involved in the prevention, early diagnosis and treatment of gingival diseases. If gingivitis is left untreated, it can advance to periodontitis. In addition, the management of obesity is important to prevent periodontal disease.

5. CONCLUSION

Considering that there is only very limited information on such associations, these findings are

important. Although there is biological plausibility to the occurrence of these associations, there is a lack of epidemiological data to support them. The clarification of this issue is important in the clinical practice of pediatric dentists.

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RADIATION THERAPY CONTRIBUTION IN BREAST CANCER TREATMENT

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ABSTRACT

Breast cancer has a high incidence, prevalence and mortality, representing a serious public health problem, demonstrating the need for early diagnosis and effective treatments for it to become a curable disease. Against this background radiation is presented as an important therapeutic tool. The objective of this study was to describe what is the contribution of radiotherapy in the treatment of breast cancer, using as a methodological approach to literature. The therapeutic approach to breast cancer can vary depending on multiple factors such as individual characteristics, disease staging and the psychological characteristics of the patient, prioritizing the quality of aftercare life. Radiation therapy is considered a method able to control or cure cancer by inhibiting cell growth and division, and their application is basically in two ways, brachytherapy or teletherapy, depending on the location of the tumor. This therapeutic method plays a key role because it can prevent local recurrence of breast cancer operated after conservative treatment or chest wall following mastectomy, and also prevent relapse in the areas of lymphatic drainage when there is lymph node involvement. To avoid local recurrence, radiotherapy increases the chance of cure patients, contributing effectively in the treatment of breast cancer.

KEYWORDS: Treatment, radiotherapy, breast cancer.

1. INTRODUCTION

The cancer is in a disease with a multifactorial etiology and natural history, often providing cellular mutations of genes that control cell growth and mitosis. Neoplastic diseases are developed progressively from any tissue within any organ, when normal cells lose their functional capacity dividing uncontrollably, to give a mass of cancerous tissue¹.

Breast cancer is the second among cancer cases, both globally and in Brazil², has been estimated for 2015 in the country, the occurrence of about 57,120 new cases³. Every year, approximately 1.3 million women are affected by breast cancer in the world⁴. The incidence rates increase reflecting the global trend towards the predom-

inance of lifestyles that encourage exposure to risk factors⁵.

Control of breast cancer is a concern for public health services⁵, characterized as the primary malignancy that affects women in Brazil⁶. The severity of the disease is a challenging situation and requires changes, especially when considering the relationship between early detection, therapeutic perspectives and women's quality of life².

As for the origin of breast cancers, it is believed that 90% to 95% of them are sporadic (non-family) and arising from somatic mutations that occur during life, and 5% to 10% are hereditary (family) due the nucleotide mutations perpetuated in the family line by germ cells, which confers susceptibility to breast cancer⁷.

Early diagnosis is one of the main prognostic factors and therapeutic choice will depend on the clinical stage of the disease, the anatomical and pathological characteristics, clinical conditions, age and desire of the patient⁸.

The most effective means of early detection of breast cancer are: the systematic examination of the breast, or clinical examination, done by specialized professional, mammography and self-breast examination⁶.

The treatment typically comprises performing surgery to remove the tumor mass, chemotherapy (chemotherapy), radiation therapy (RT) and in some cases hormone therapy⁵.

Radiotherapy is a treatment for cancer locoregional, painless performed by the application of ionizing radiation, damaging the structure of deoxyribonucleic acid (DNA) cell and thereby interfering with tumor growth and metastasis⁹, reducing the risk of local recurrence and increase survival¹⁰. The application of radiotherapy is basically performed in two ways: the external called teletherapy, and internal, brachytherapy¹¹.

Considering radiotherapy as an important adjunct in the treatment of malignancies, the aim of this study was

o describe his contribution to the treatment of breast cancer.

2. MATERIAL AND METHODS

This study is a literature review made through literature searches using the datas of Google Scholar and SciELO data. The keywords used were: treatment, radiotherapy and breast cancer.

We performed a reading and selective analytical sources of interest according to the quality and relevance of the content to the proposed theme then was the construction and subsequent presentation of the article

3. LITERATURE REVIEW

Cancer

Etymologically the word cancer, cancer of the Latin meaning crab, must have been employed in analogy to penetrant growth mode, which can be compared to the legs of the crustacean, which introduces the sand or slurry to settle and hinder its removal¹².

Cancer can be defined as a set of more than 100 diseases that have in common the uncontrolled growth of cells that invade tissues and organs and can spread (metastasize) to other parts of the body¹³.

These cells divide rapidly and tend to be very aggressive and uncontrollable, causing the formation of tumors or malignancies. On the other hand, a benign tumor is characterized as a localized mass of cells which multiply slowly and resemble the original tissue, constituting rarely life threatening¹⁴.

According to the National Cancer Institute José Alencar Gomes da Silva (INCA), the factors that can cause cancer are varied and may be internal or external to the body, both of which are interrelated. External causes concern for the environment and the habits and customs of their own social and cultural environment. The internal causes are most often pre-determined genetically and are linked to the body's ability to defend itself from external aggressions. These causal factors may interact in various ways, increasing the probability of malignant transformation in normal cells¹⁴.

Establishing itself as a global public health problem¹⁵, cancer affects both the developed countries, the developing ones, merits further research in order to get better quality and humanization in care for patients with this disease¹⁶.

It is estimated that by 2020, the number of new cases per year to reach 15 million, of which about 60% occur in developing countries¹⁷. Already for the year 2030, with an expected 27 million incident cases of cancer¹⁸.

In Brazil, two main indicators characterizing cancer as a public health problem. First, the gradual increase in

the incidence and cancer mortality in proportion to population growth and socioeconomic development. Second, the challenge this poses to the health system, especially in the population's access guarantee to diagnosis and treatment¹⁹.

Gutiérrez *et al.*(2009)²⁰ notes that economic development, technological development, industrial growth, women's entry into the labor market, aging population are factors that, deprived of educational conditions capable of generating in the population aware of the risk factors related to cancer, as well as the right to make use of diagnostic tests and proven effective treatments become ingredients for the unfavorable condition in cancer advancement of control in our society.

According to Hazinet *al.* (2015)²¹, developing countries still face significant barriers to curing cancer, among which can be highlighted the delay in diagnosis, high early mortality and treatment abandonment.

It should be noted that the late cancer diagnosis difficult treatment with curative purpose, reducing the length of survival and quality of life²², may cause permanent states of mutilation, loss of organic functional capabilities leading to early retirement or death of the individual, in a continuous cycle of personal suffering, emotional and financial family breakdowns and resource commitment of the social area of health and the country's own economy²⁰.

Regarding the treatments for cancers, which have the objective to cure, prevent recurrence and increase survival with quality for the patient, there are the surgery, radiotherapy, chemotherapy, hormone therapy and immunotherapy²³.

The most common symptoms resulting from treatment are: depression, anxiety, insomnia, fatigue, psychological stress, vomiting, nausea and limitations of skills. Fatigue is the most debilitating symptom, increasing the time to return to work, while anxiety and depression cause the withdrawal from normal activities²³.

It is observed that patients with malignant diseases have been increasingly admitted to the intensive care unit (ICU) due to complications of the cancer itself or the side effects of treatments¹⁵.

The cancer approach represents a major challenge with regard to confronting the problem fully, demanding more skilled workers and improved to cope with the new demands of professional practice, directed to the epidemiological reality of our country¹⁷.

Breast cancer

Breast cancer is defined as a group of malignant epithelial tumors characterized by invading adjacent tissue prone to distant metastasis²⁴.

The most common forms of breast cancer are ductal and lobular invasive carcinomas. Other rarer types of invasive breast cancer are: medullary carcinoma, mucinous carcinoma, papillary carcinoma, inflammatory carcinoma²⁵.

Breast cancer is in a heterogeneous group of diseases with different behaviors. The heterogeneity of this cancer can be observed by various clinical and morphological manifestations, different genetic signatures and consequent differences in therapeutic responses¹⁴.

INCA data indicate breast cancer as the most common cancer among women worldwide and in Brazil, second only to nonmelanoma skin, accounting for about 25% of new cases each year. Breast cancer also affects men, but it is rare, accounting for only 1% of all cases of the disease¹⁴.

For the year 2015, in Brazil, estimated the occurrence of about 57,120 new cases of breast cancer and is considered a major public health problem³. It adds that, mortality rates remain high, most likely because the disease still it is diagnosed in advanced stages²⁶.

This type of cancer is relatively rare before the age of 35 and above that age its incidence is growing rapidly and steadily²⁷, especially after 50 years¹⁴.

According to Garcia *et al.*(2015)²⁸, the breast cancer can trigger many negative feelings in women and may be strongly related to changes in their quality of life. Among them, you can highlight the fear of diagnosis, possible surgery, the uncertainty of the prognosis and recurrence of the side effects of treatment, suffer the pain and face the possibility of death.

Among the risk factors of the disease, it should be noted that the changes in women's lifestyle tend to increase them, associated with events such as: the absence of motherhood, achieving hormonal intervention, motherhood after 30 years of age, sedentary lifestyle, poor diet, obesity, smoking and excessive alcohol consumption, in addition to family history of cancer and age, the main risk factor for the diagnosis of breast cancer, in which the age of incidence is more common in women over 40 years^{4,13,25,27,29}.

Is worth mentioning that the presence of cancer in women may not exactly be avoided because it also depends on genetic factors that are beyond the woman's control in its entirety¹³.

It is estimated that 30% of cases the disease can be prevented when healthy practices are adopted as practice regular physical activity, eating healthily, maintaining proper body weight and avoid alcohol consumption. Breastfeeding is also an important protection factor¹⁴.

The proper prognosis of breast cancer occurs typically when it is detected early, leading to a reduction in mortality and physical, psychological and social effects

caused by this type of cancer²⁵.

Early diagnosis being prioritized, mainly from guidance, information and consistent care practices can significantly alter the reality of late diagnosis of breast cancer, as well as faster access to health services, optimizing the therapeutic steps⁴.

Breast cancer, diagnosed and treated in time, it reveals a good prognosis tumor and the five-year survival rate reaches 85%. Late treatments bring harm to the quality of life, it requires more aggressive approaches, the need to use multiple therapeutic modalities, and results in overlapping consequences. In Brazil, the high mortality rate can be partially explained by the fact that, on average, 60% of breast cancers are diagnosed in advanced stages³⁰.

Currently, the guidance is that women do self-palpation of the breasts whenever you feel comfortable to do so (in the bath at the time of change of clothes or other daily situation), without a specific technique of self-examination. Early detection of breast cancer can also be done by mammography. The recommendation in Brazil, updated in 2015, is that women between 50 and 69 years do a mammogram every two years. The diagnostic mammography, with the purpose of investigating suspicious breast lesions may be requested at any age, the doctor's discretion¹⁴.

The results of mammography are classified according to the Breast Imaging Reporting and Data System (BI-RADS®), published by the American College of Radiology and translated by the Brazilian College of Radiology³¹.

This system uses categories 0-6 to describe the survey findings and provides recommendations of conduct.

The most common symptom of breast cancer is the lump of onset, usually painless, hard and bumpy, but there are tumors that are soft consistency, globular and well defined. Other breast cancer signs are skin edema similar to orange peel, skin retraction, pain, nipple inversion, hyperemia, desquamation or ulceration of the nipple, and papillary secretion, especially when it is unilateral and spontaneous. The secretion associated with cancer is generally transparent and may be pinkish or reddish due to the presence of red blood cells. There, may also be palpable lymph nodes in the armpit¹⁴.

The therapeutic approach to breast cancer can vary depending on multiple factors such as individual characteristics, disease staging and psychological characteristics of the patient, prioritizing the quality of aftercare life³.

The most common forms of cancer treatment include surgery, chemotherapy, radiation therapy or hormonal therapy, and usually more than one way can be used in a

complementary manner³².

Surgical procedures include mastectomy and breast conservative surgery (lumpectomy and quadrantectomy), which change the appearance, sensitivity and functionality of the breasts³³, complications may arise as local infections, skin necrosis, scarring complications, disorders of the range of motion, lymphedema, functional disorders, nerve damage, pain and sensitivity of upper limb ipsilateral to the operated breast disorders³⁴.

The other modalities of treatment (chemotherapy, radiotherapy and hormone therapy) can cause side effects like nausea, vomiting, fatigue, alopecia, induced menopause, reduced vaginal lubrication, decreased sexual arousal, dyspareunia and anorgasmia³³.

A radical mastectomy was the standard treatment for breast cancer for years, regardless of any associated factor. However, from the 1980s, change was observed in the therapeutic approach, following the trend of treatments more conservative, but without having compromising oncological safety⁸.

Radiotherapy

Radiation therapy is a method to control or cure cancer by inhibiting cell growth and division, which has three distinct purposes: to cure cancer when it is used to eradicate a tumor order; be palliative, acting in reducing symptoms such as pain, bleeding and respiratory distress; and have an adjuvant role when applied in order to eradicate cancer cells that may possibly lead to relapse. The radiotherapeutic treatment time varies according to the type of cancer being treated, its staging and therapeutic objective sought⁹.

The RT can be used as adjuvant therapy or neoadjuvant surgery³⁴, and for the most part, is performed on an outpatient basis³⁵. It is a technique to remove local tumor cells by beams of ionizing radiation produced by apparatus or emitted by radioisotopes natural. A pre-calculated dose of radiation is delivered in a given time and in a given tissue volume³⁴. The total dose is fractionated in daily applications for a variable time up to two months³⁵.

Ionizing radiation conceptualized itself as radiation having sufficient energy to ionize molecules by the release of electrons from atomic structure, such as x-rays, beta particles, alpha particles and others for the treatment of cancer and certain benign diseases¹¹. Ionizing radiation is electromagnetic or corpuscular and to interact with the tissues, giving rise to fast electrons which ionize the medium and form chemical effects, such as the water hydrolysis and breakdown of DNA chains³⁶.

Radiation therapy may act on the cell's DNA, preventing it from multiplying (reproductive death) or inducing a direct death by apoptosis¹¹. The molecular

mechanism of interaction with the nucleic acid can be direct or indirect by means of free radicals⁹.

Each cell responds to radiation in different proportions, equivalent to its specific radiosensitivity. The sensitivity of a cell to radiation results from their mitotic activity and degree of differentiation, i.e., the less differentiated and a larger number of divisions the cell will be more sensitive to radiation⁹.

It is emphasized that the radiation also affects the regions of normal tissue, causing side effects such as pain, fatigue, sensory and skin changes, such as radiodermatitis. About 90% of patients may experience a dose-dependent skin reaction³⁴, yet have the possibility of repair with greater efficiency than the malignant cell. Thus they are achieved positive results by the total or partial removal of tumors treated with radiation¹¹.

Patients treated with radiotherapy may also experience other side effects such as loss of self-esteem and confidence, changes in mobility and sensation on the affected side, emotional shock, confusion, anxiety, fear, feelings of isolation, changes in routine³⁵, lack of appetite, hair loss, nausea, diarrhea⁹.

The application of radiotherapy happens in two ways basically: external, called teletherapy, and internal, brachytherapy¹¹. The choice depends on the tumor location³⁶.

External radiation therapy: Teletherapy

The radiotherapy is the most common application technique, in which the ionizing radiation passes through various tissues before reaching the tumor area and thereby normal organs and tissues are subject to the toxic effects of the emitted rays. The absorption of radiation can cause biochemical changes and damage at the cellular level both immediately as late¹⁰.

In teletherapy, the ionizing radiation beam is directed to the target region of the body called field, at a distance. External radiation therapy uses radioactive sources from nuclear or linear accelerators, which give rise to radiation by accelerating electrons¹¹.

The radiations are generated by devices that are remote from the patient. The cobalt pump is a container containing a source of cobalt, a device with a small window that opens and lets the radiation beam leaving monitored, allowing tumor treatment. In this case, the treatment time and all others involved physical parameters are carefully monitored and examined by a permanent quality control program³⁶.

The linear accelerator operates very similarly to a device x-rays, or radiation is only generated when the apparatus is connected to a source of electrical energy. Radiation of the formation mechanism is more complex, but the net effect is equivalent to: a controlled radiation

beam impinges on the target to be treated³⁶.

Internal Radiotherapy: Brachytherapy

In brachytherapy the radioactive element is positioned next in contact or inside the organ to be treated¹¹. Often it is a surgical procedure and should be performed in the operating room with anesthesia³⁶.

There are two types of brachytherapy treatment. The high dose rate (High Dose Rate - HDR) is fractionated, makes use of programming via computer, and has shorter exposure to radiation, which allows outpatient treatment. The high dose of radiation delivered increases the tumor cure chances. Low dose rate (Low Dose Rate - LDR) is a continuous treatment, with longer period of exposure, which requires hospitalization of the patient¹¹.

We emphasize that, in brachytherapy the radiation is applied directly to the tumor site by means of molds, catheters, implants¹¹, or prostheses that act as guides for application on site³⁶, which enables radiate small target volumes with high dose radiation. This technique makes it possible to save neighboring structures not affected by the disease, as it presents a significant drop dose as it departs from the sources¹¹.

Radiotherapy in breast cancer

Breast cancer because of its high incidence, prevalence and mortality requires early diagnosis and effective treatments that can become a curable disease. RT presents itself as a valuable tool in this therapeutic context where most patients with breast cancer to receive as part of their treatment, reducing significantly the mortality due to cancer³⁷.

Radiotherapy has in order to prevent local recurrence of breast cancer operated after conservative treatment or chest wall following mastectomy, and also prevent relapse in the areas of lymphatic drainage when there are lymph nodes. To avoid local recurrence, radiotherapy increases the chance of cure for patients³⁸.

Radiotherapy in breast-conserving surgery

The breast conservation is based on surgical excision of the tumor (setorectomy or quadrantectomy) and axillary management (sentinel lymph node with or without axillary dissection) followed by radiation therapy, and is currently considered the standard local treatment for the disease in early stages⁸.

After conservative treatment, the patient usually needs to receive radiation therapy to prevent relapse occurs in the operated breast. Patients over 70 years with small tumor (less than two centimeters), no nodes in the engaged armpit and with positive estrogen receptors, may not need radiotherapy even after treatment with preservation of the breast, since the local recurrence in

these situations is considered low (about 7%), provided that treated with hormone³⁸.

Survival rates after conservative surgery followed by breast irradiation are similar to those observed after modified radical mastectomy. As a result, the use of conservative surgery has increased steadily in recent decades, with a corresponding increase in the use of the mammary radiation³⁷.

The method usually used for RT breast, conservative therapy is teletherapy, but the reinforcement can be accomplished with teletherapy or brachytherapy. In radiotherapy, the most commonly used is electron energy variable, depending on the breast size and depth of the tumor bed; brachytherapy, iridium-192 may be used by placing plastic catheters or needles, usually two planes for broad coverage of the target volume. They can be placed at the time of surgery, with subsequent loading of radioactive sources⁸.

The best way to define the reinforcement of the place is the view of metal clips placed in the surgical procedure. In the absence thereof, can be used imaging tests (ultrasound, mammography or MRI of the breast) to provide guidance on the location of the tumor bed, associated to the surgical scar information. A common practice is to treat the whole quadrant headquarters of the primary lesion⁸.

Post-mastectomy radiotherapy

After lumpectomy or radical mastectomy with reconstruction, radiotherapy is performed when the tumor is larger than five centimeters, where the nodes of the axilla are compromised when there is invasion of skin and existence of more than one breast tumor removed. In these situations, the patient receives the applications both in the chest wall or in the reconstructed breast as well as in lymph drainage³⁸.

Even after total mastectomy, a relevant local recurrence risk (in the chest wall or regional lymph nodes) may remain in certain groups of patients. If there is lymph node involvement (or the armpit has not been adequately assessed), RT after mastectomy can enable effective reduction and delay in the occurrence of local recurrences following both simple as radical mastectomies³⁷.

Radiotherapy adjuvant

Adjuvant radiotherapy is a local treatment modality applied in breast cancer to reduce local recurrence after surgical treatment, however the application of ionizing radiation in the primary tumor site may cause systemic effects³⁷.

The result of the application of adjuvant radiotherapy is beneficial for women with younger age, in tumors in advanced stage and lymph node involvement. The lore-

gional radiation is also known where no adjuvant chemotherapy indication, since the addition of this therapy is important for achieving higher cure rate and survival⁴.

For patients who did not receive chemotherapy, it is proposed that the RT starts within a period of eight weeks after surgery. When both RT as CT are indicated, the following sequences are executable: RT followed by CT, CT followed by RT, RT and CT and RT simultaneously between CT cycles. However, despite the effectiveness of RT can be increased by concomitant CT, toxicity may also increase³⁷.

Collateral effects resulting from the application of Radiotherapy in breast cancer

Radiation therapy, especially in patients with breast cancer, can damage the long-term function of the shoulder joint ipsilateral to the irradiated site, with even greater impact when the axillary fossa also receives radiation. Another commonly described side effect of radiation therapy is fatigue, regardless of tumor location⁹.

Radiotherapy when associated with radical treatment for breast cancer, is admittedly significant for significant morbidity in the ipsilateral to the site of disease. Injuries to the lymphatic system, venous thrombosis of axillary and subclavian veins, limiting cicatrice retraction are well known complications. A serious and poorly understood complication is critical ischemia of the upper limb due to arterial injury in these patients³⁹.

The combination of factors triggered by surgical element and RT can negatively impact the daily lives of these women, causing pain in the upper limb, functional disorder and impairment in activities of daily living and the possibility of these symptoms worsen after RT³⁴.

Side effects of RT applied to the treatment of breast cancer, such as subcutaneous fibrosis, expose women to the risk of lymphedema, brachial plexus injuries and limitation in shoulder movement. The physical suffering affects survival, as it may hinder the coping strategies in women undergoing radiotherapy treatment, in which it observed high prevalence of tension, nervousness, feeling of loneliness, anxiety and depression, and social changes in lifestyle and self-image, directly influencing the health and wellness, damaging the quality of life of these women⁴⁰.

The skin changes resulting from RT can interfere with superficial sensitivity of the irradiated region, but it is believed that the main reason for sensory change is due to the total or partial damage to the intercostal nerve sensory (NICB) during surgery. The NICB is derived from the lateral cutaneous branch of the second and third nerves intercostal and his injury is responsible for frequent complaint of discomfort or unpleasant feeling, or can promote dysesthesia in the posteromedial edge of the upper arm, underarm or chest wall the affected side,

which may cause complaints hypoesthesia, anesthesia, burning, pitting localized pain and even hiperesthesia³⁴.

Rehabilitation programs for women for breast cancer assist in improving the quality of life. How many physical complications occur simultaneously at RT for breast cancer, it is important that effective prevention strategies are identified and well targeted⁴⁰.

4. CONCLUSION

Radiotherapy contributes valuable in the treatment of breast cancer and may act in palliative treatment, curative and adjuvant helping to improve the quality of life and increased survival rate of patients suffering from cancer.

The cancer, especially breast, is a public health problem in Brazil, and is for the health system a challenge to ensure is full, accurate diagnosis, appropriate treatment and necessary support for health recovery of individuals affected by cancer.

We emphasize the need to structure a network of regionalized and hierarchical services to ensure comprehensive care to the population, which requires qualified professionals to meet the demand of the population.

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BURNOUT SYNDROME: AN LITERATURE REVIEW ABOUT THE BURNOUT IN DOCTORS AND MEDICINE STUDENTS

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ABSTRACT

Burnout Syndrome is a psychological disease that may involve professionals that have constant contact with other human beings. It's a very common syndrome in health and education professionals, inducing mood variation and demotivation. The persons that presents this syndrome are in a exhaustion state about their professional lives, failing to invest on theirs work and affective relationship that results from it. This article is a literature review with the purpose to analyze the incident of Burnout Syndrome in professionals and the impacts arising from this in their professional and personal lives.

KEYWORDS: Burnout, Depression, Suicide

1. INTRODUCTION

Burnout Syndrome, also known as Professional Burnout Syndrome is an emotional/ psychological dysfunction resulting from stress in jobs that involve direct contact with others persons¹.

The purpose of this article is to explain briefly, through a literature review and statistical data, the presence of risk factors in the workplace and the damage caused by the syndrome at work and individual staff. Moreover, it will be discussed how to prevent and monitoring changes in health professional, in order to minimize the appearance of symptoms of the syndrome and to establish an adaptation of the subject in the workplace.

2. MATERIAL AND METHODS

To structure this study, we carried out a literature review of scientific literature, available in SciELO databases, Lilas, MedPub and Medline.

For the article development were used literary sources that defined the syndrome and arguing about the occurrence of Burnout in medical students and doctors.

The terms used for the research were: burnout syndrome, risk factor, depressive disorder, psychosomatic disorder, stress, work, suicide, medical students.

3. LITERATURE REVIEW

Health professionals, particularly those in palliative care, often deal with pain and death, often overlapping these situations to their own problems¹. These professional requirements are responsible for an accumulation of stressful situations, which combined with individual, relational and organizational factors may lead to the development of burnout syndrome¹.

According to the theoretical model of Maslach (1982)², the burnout syndrome is a process in which the emotional exhaustion is the precursor size of the syndrome, followed by depersonalisation and finally the feeling of reduced personal accomplishment at work. The term burnout, of English origin, is used to name a syndrome characterized by excessive and prolonged stress in the workplace, also known as professional burnout.

The earliest records of burnout syndrome was carried out in the 70s by Freudenberg to observe the volunteers who worked, wear on mood and motivation. In 1976, the term was used to define cases of burnout³. Maslach (1982)² described the burnout syndrome as a disease that affects, more often, people who work in direct contact and continue with other human beings. To Codo & Vasques-Menezes (1999)⁴, burnout consisted of the withdrawal syndrome, because in this situation the individual ceases to invest in work and in personal relationships arising from his.

The two areas that have the highest cases of occupational affected by burnout syndrome are health and education. Teachers, doctors and nurses are the most affected by the syndrome due to the continuous and direct contact with other people associated with constant charging for the work, is the head of the company or the individual. In the medical field it can be proven by professional suicide rates that exceed the general population⁵.

Simon & Lumry (1968)⁶ described a few reasons why doctors commit suicide and among them are the denial of psychological stress of professional and personal nature, the difficulty to seek help in matters related to the emotional and psychological and frustration with the profession. According to Simon & Lumry (1968)⁶, doctors are generally individualistic, competitive and compulsive and can be easily frustrated in his ambition for recognition. These factors can be enough to trigger the professional burnout on the individual, or burnout, causing cases of anxiety and depression. In some cases there is prejudice, by the individual or family and friends, with psychiatry, which prevents him from seeking professional help. In this case, the individual ends up resorting to the use of illicit drugs, alcohol and, in more severe cases, suicide⁵.

Weskstein (1979)⁷, when writing about suicide among physicians, says that the main factors are the loss of omnipotence and omniscience designed for training and professional experience, coupled with constant collection, either by the individual or by others, and the fear of failure. In 1991 the British Medical Journal (1991)⁸ made a brief analysis of physician stress and among the factors cited were the high workload and work pattern. It was presented by Waring (1979)⁹ on a literature review on medical stress and professional burnout enrolled or not suicide, that the main factors were the family psychiatric history, life experience and personality of the individual. It can be concluded from the review by Waring (1979)⁹ that some people are more vulnerable to enter into a state of fatigue and depression stress account and working conditions.

One way to try to reduce cases of burnout and suicide among physicians and medical students is to prepare the student front of the actual conditions of their future work, not encourage you to use omnipotent idealizations to face situations difficult to control during his professional life¹⁰. You for doctors in exercise, it is important to raise awareness of its limitations and weaknesses, and report on professional help in situations where the individual can not cope alone. Our class must become more sensitive to the existence of this problem and better able to recognize the "request for help" from a colleague and himself, without, however, failing to look after the interests of the public¹⁰.

4. CONCLUSION

Burnout Syndrome is a serious disease that affects many professionals, most often comes quietly, without drawing attention of those around. Very common in health professionals, as in doctors, for example, is a disease associated with over-charging, either by the individual himself or others, beyond expectation break with the profession.

During medical school, or even before entering college, the student creates an image of the profession that is being broken gradually over the years of operation. The image of irreproachable medical, powerful, immune to failure, that is, almost a being in a state of perfection, is demystified on the day. Out of college students are faced with situations of lack of recognition, competitiveness and errors. This is where the individual finds himself helpless realizing that all that idealization of the self professional breaks every day.

Faced with these conflicts, dissatisfaction with the profession and their own performance ends triggering the professional burnout, which can be accompanied by pictures of depression, anxiety and seclusion. It is not uncommon cases where individuals use this situation as an "escape valve", licit and illicit drugs or has self-destructive behavior and may develop in severe cases, to suicide.

A more realistic preparation is required of medical students for their future careers, dispelling all kinds of idealization that the young student has on his profession. Universities should expose the student to the truth about the day to day work and, especially, show that the doctor is not a demigod, but a human error-prone and weaknesses like any other.

Moreover, to adapt to this reality, it is essential entry increasingly early student in the medical environment, through internships in hospitals and units Basic Health. The internship is a unique opportunity that combines academic knowledge with the living experience desktop, providing for the learner greater ability to deal with adversity the stressful day to day medical environment.

Among the active professionals, the ideal is to highlight the importance of medical care in cases of fatigue, as well as improving working conditions.

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CHILDREN AND ADOLESCENTS SUICIDE: A SILENT REALITY

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ABSTRACT

Suicide is by definition an intentional act of killing of yourself, which affects many people from childhood to adulthood and old age, being an outlet towards the solution of psychosocial problems involved. This research is a literature review, which was performed by searching national and international bibliographic data, aiming to portray the context and the factors involved in suicide of children and adolescents, and the reasons why the suicidal act occurs. Thus, it is valid to analyze the understanding of suicide and definition of death for this age group, for the purpose of identifying preventive measures to reduce the risk factors and increase protective factors. Suicide in children and adolescents although it is rarely discussed, it is very relevant because the presence of risk factors is constantly experienced by society.

KEYWORDS: Suicide, children and adolescents, psychosocial problems, risk factors, prevention.

1. INTRODUCTION

According to the World Health Organization (WHO)¹, suicide is a leading cause of death worldwide and results from an interaction of biological, social, cultural and environmental. In Brazil, according to the Ministry of Health (2011)², in 2009 presents suicide as the fourth leading cause of external death in adolescents 10-19 years and the sixth leading cause in children aged 5 to 9 years old.

Moreover, according to WHO data, from 2002 to 2012, the suicide of children and pre-teens aged 10 to 14 years in Brazil grew 40% and aged 15 to 19 years, the increase was 33 5%. These growth figures are worrying, since the suicide of children and adolescents is rarely discussed in the literature and are often seen as accidents or other causes and not always documented.

Suicidal behavior, according Werlang *et al.* (2005)³, It is divided into three categories, which consist of suicidal ideation (composed of thoughts, ideas, plans and desire to kill), suicide and completed suicide attempt. Because of this, it is necessary to identify this behavior in the early

stages to prevent the suicidal act.

It is estimated that for an adult suicide is consummated, there must be 10 to 20 attempts that did not result in death, on the other hand in the case of children, about 300 attempts are estimated for completed suicide, this is due to the use of little lethal methods or difficulty in getting instruments. Children, especially, have great vulnerability, which reflects the fact that many of them on the various risk factors and stress conditions, try to take their own lives without even knowing what it means.

According to WHO (2000)¹, Studies show that adolescent males commit suicide more compared to female adolescents. However, suicide attempts rates are two to three times higher among girls. This is due to the fact that they have higher frequency of depressive symptoms than boys, but they are more willing to talk about their problems and seek help, which can prevent the onset of suicidal act. Unlike the boys are more aggressive and impulsive, and seeking more violent strategies for the involvement of suicide.

Therefore, this article aims to present an overview of the different perceptions of how suicide is addressed, as well as understanding of suicidal behavior with focus on factors related to children and adolescents, its etiology and concept of death of concepts for this age group and also, emphasize preventive measures, since the suicide of children and adolescents is a public health problem and is often underreported.

2. MATERIAL AND METHODS

In this literature review article was performed by searching bibliographic databases such as Science Direct, Scielo, electronic journals in psychology without delimiting specific period in order to identify the main themes, it was used as keywords: "suicide", "suicide of children and adolescents", "juvenile suicide" and "suicide prevention". Was used as a criterion of choice papers until 2015, written and published in Portuguese and English, selecting those that emphasized the risk factors of child and adolescent suicide, preventive measures as well as the understanding of death for this age group.

3. LITERATURE REVIEW

Different views on suicide

Since the nineteenth century several theories have been published in the literature, in order to define the causes of suicide. First, the sociologist Émile Durkheim published the book "Suicide", which stated that it was strongly related to three main factors: hit individuals who were less integrated in their family group, religious or political; applied to companies in which an individual should sacrifice for the group; and due to the deregulation of social mechanisms. Shortly after this theory was complemented by Maurice Halbswachs, with the book "The causes of suicide" in which specified that the only cause of suicide was loneliness⁴.

However, for psychoanalysis, the suicidal act is seen as the prevalence of the death drive on the life drive, which is associated with the individual desire and anguish. For Freud (1920, cited by Senna *et al.*, 2014)⁵, there must be a balance between the two drives in which the death drive is linked to the service of life, and states that this can be expressed through aggression and, when focused on the individual, culminating in suicidal act.

Again according to Freud's view that exposes in his text "Mourning and Melancholia" cited by Marqui (2009)⁶ the characteristics presented by a similar melancholic individual to suicide:

"Melancholy still shows something else that is absent in mourning - an extraordinary decrease in self-esteem, an impoverishment of his ego on a large scale. In mourning, it is the world becomes poor and empty; in melancholia it is the ego itself. The patient represents his ego to us as valueless, incapable of any achievement and morally despicable; he scolds and degrades, waiting to be expelled and punished". Freud apud Marqui (2009)^{6,7}.

The Theory of Freud can be illustrated by a sentence described by the French novelist Gustave Flaubert, published in 1853: "You can die, since they cannot make others die, and every suicide is perhaps an embedded murder." In this context, it can be inferred that the suicide rate is higher in structured societies and where the outer violence is more orderly and regulated, as stated Souza (2015)⁴.

It is observed, then the text of Freud (2012)⁷ "The malaise in civilization", which supports the idea that society, when organized, generates a set of conflicting rules with individual desires. Thus society imposes restrictions against the welfare of its population, which can lead to psychic conflicts and lead to suicide. At the same time, children and adolescents may develop a behavior suicidal ideations by feel repressed by rules and afflictions judged unbearable that generate conflicts with themselves and find in death the only solution.

Suicide is complex and inherent to own reasons for

each individual, from the Greco-Roman society to contemporary cases of suicides are recorded due to various causes and ideas. According to Souza (2014)⁴, in the Greco-Roman society, was preferred death to dishonor, reasons had major suicide rates; in middle age, suicide was considered "devil's art" and was forbidden and punished; and in modern and contemporary society, suicide is related to many reasons one of which psychosocial problems that affect the entire world's population.

Understanding suicidal behavior in children and adolescents

Suicide in children and adolescents is very complex, and its main causes are due to biased factors the society of XXI century, since suicidal behavior is multifactorial, triggered by genetic and environmental factors that instigate children and adolescents end up with the very life.

First, it is valid to define how children and adolescents define the concept of death, in order to infer that suicide is for them. According to Nunes *et al.* (2015)⁸ to understand the concept of death by children, should bear in mind the concept of reversibility, which is to mentally reverse a kind of reasoning. From this, they identified three basic components to characterize the concept of death, among them is the irreversibility in which it is inferred the understanding that a living individual when it dies, does not return to live; non-functionality in which cease all vital functions and universality which defines that everyone is affected by the death, including the children themselves.

Nagy (1959, cited by Torres, 1980)⁹ also identifies the relationship of these components with the concept of death. However, notes the existence of three stages, the first of which comprises children up to 5 years, and determines that they do not have the concept of death defined, understanding it as a reversible and temporary event; the second step involves children 5 to 9 years and determines that the child can already understand death as avoidable, but irreversible and that affects everyone, including herself; and finally, the third and final stage comprises children aged 9 to 10 years and determined that only at this stage the child begins to understand death as inevitable and that through it ceases to all activities of the body.

Thus, according to the concept of death established by children and adolescents can understand what suicidal act is for these, in order to merge rational and irrational beliefs, sometimes articulate and logical, sometimes inconsistent and incomprehensible. According to Secj (2010, cited by Sebastian, 2012)¹⁰, the cause of suicide should not have just a single factor, should be considered a history of the subject, their problems and past conflicts and can therefore, it is an accumulation of previous problems that hit the peak in adolescence.

As a result, there are several factors that can lead children and teenagers to a suicidal act, among the most relevant and to be emphasized here are the psychosocial and

neurobiological.

Psychosocial aspects

Many factors are essential for the psychological and social development of a child, the most important is the family environment you are in, as well as their emotional relationships. According to Steinberg (2000, cited by Hutz, 2002)¹¹, the family is responsible for the socialization process of children, through which they acquire appropriate behaviors and acceptable to the culture, provides a social performance and the acquisition of autonomy. It is in infancy and childhood, you understood from birth to six years of age, there is more interaction with his family and established patterns of attachment that are crucial to the development of a pattern of social behavior and personal.

Given this assumption, according Hutz (2002)¹¹, parents who show little interest in education and lack of emotional care of children are considered negligent. These are considered less able to control the behavior of children and do not show affection, so parents are little involved with the education of children, and do not show interest in their activities and feelings, what do they do not play the role of socializing. As a result, education with this reckless familiar pattern, affects the psychological development of children and adolescents, undermining their social competence, academic and personal, increasing the occurrence of mental disorders such as depression, anxiety and somatization and externalizing problems of their feelings are risk factors act or attempted suicide for this age group.

Children who carry out a suicide act have significant psychological characteristics, among them the most relevant are second Alencar (2012)¹², one of the impulse control disorder, low tolerance to frustration and a tendency to demand attention and affection, with previous suicide attempts and constant threats, manipulation in relation to colleagues, jealous brothers, present desire to die and low self-esteem.

In addition, WHO (2000)¹ emphasizes that suicidal behavior is more common (in children and adolescents) due to psychiatric disorders, among them the most important and relevant are: Depression - may have antisocial behavior and usually have somatic complaints such as headache, stomach pain, leg or chest.

Anxiety disorders: may have psychosomatic symptoms, and show a strong association between suicide attempt and anxiety especially in men.

Alcohol and drug abuse: history of alcohol abuse was found in one in four children and adolescents who committed suicide act.

Eating disorders: due to the idealization of the body. Especially the girls suffering from anorexia and bulimia, suicide risk is about 20 times that of young people.

Psychotic disorders: few children have a severe form

of psychotic disorders such as schizophrenia or bipolar disorder. Also, several authors reveal the reasons why children and adolescents commit an act or try to commit suicide. For Seminotti (2011, cited Cavalin, 2012)¹³ this is due to the stressor in children, which is preceded by the abandonment or significant losses, accompanied by lack of support from other people or family members; Harold Jacobzine (1960)¹⁴, notes that a high incidence in children was observed with suicidal behavior, which had disorganized homes and broken resulting from death, separation or divorce of parents; and yet for Fernandes de Abreu (2010)¹⁵ adolescents and children who attempt suicide, almost always have a long history of progressive family instability and discord, reaching a point where they feel unable to communicate with parents or ask for support to them.

Moreover, according Cavalin (2012)¹⁶, depressive symptoms in children who attempted suicide are evident after the attempt. Most of them lose their motivation to attend school, are isolated, have no desire to perform daily tasks, show irritability with family and close people. In this sense, depression in children and adolescents may manifest disinterest in activities before attractive, and the constant presence of moodiness games, games and sports.

According WHO (2000)¹, suicidal ideation and suicide attempts in children and adolescents often appear in victims of sexual abuse, which often occurs within the family and is omitted for fear or guilt. Maltreatment in children can also cause acts of rebellion that lead to suicidal behavior, according Bakwin (1957)¹⁷, they believe that if they commit suicide, provoke guilt in their parents. Also reveals that maltreated children at home, can react with a rebellious behavior and suicide act precipitates the fear of punishment.

Therefore, according to the WHO (2000)¹, failure or low power to deal with problems, low self-esteem, as well as conflicts on its sexuality, can lead to suicide teenagers, as a family history of psychiatric illness intrigues, family rejection, substance abuse and other stressful life situations that increase this suicidality. Also, it states that specifically in the case of child suicide is often found experiences of a dysfunctional family life and conflict, in which changes can cause feelings of helplessness, loneliness and loss of control. Yet, there is a strong relationship between the abuse of children and adolescents by peers or adults and greater suicidal ideation and suicide attempt by them.

Many cases of attempt or act of suicide in children and adolescents are omitted, the family denies and masks the event, either for lack of knowledge, because sometimes these acts are considered as accidents or carelessness by denial or fear of the consequences of their statement as to the cause of death¹³.

Neurobiological aspects

The etiology of suicide may be caused by a genetic

component, as shown have different genetic and epidemiological studies affirmed by Turecki (1999)¹⁸. However, according to this, not yet know the exact way in which genes increase the predisposition of certain individuals commit suicide, although there is evidence that genetic factors have a great influence on this pre-disposition due to the modulation of impulsive behaviors and aggressive impulsive. Thus, according Calderaro and Carvalho (2005)¹⁹ not only heredity will cause suicidal behavior, but the fact of genetic predisposition to be associated with the adverse conditions of external reality.

Based on studies that have focused on the tryptophan hydroxylase gene encoding (TPH), whose activity controls the rate of serotonin synthesis, could identify a significant association between a polymorphism of this gene and the presence of suicidal behavior among alcoholics with criminal problems as Nielsen report *et al.* (1994)²⁰.

Several neurobiological studies have shown a reduction in the related serotonergic activity with high levels of impulsive traits and impulsive-aggressive derivatives of suicidal behavior, as stated by Mann (1998, apud Turecki, 1999)²¹. Through trials, it was possible to identify a greater number of 2A serotonin receptor (5HT-2A) of this link in the prefrontal cortex of suicide and the information obtained regarding the 5HT-2A receptor, suggest that the variation of genetic factors, especially the HTR-A2 gene, modulate significantly the number of 5HT-2A receptors. It is believed that the changes can be justified through adaptive and compensatory mechanisms or secondary regulation to decreased serotonergic neurotransmission or genetic mediation. Therefore, individuals who have a serotonergic reduction in the prefrontal cortex may have more 5HT-2A receptors along with impulsive, aggressive behavior. What about the HTR-A2 gene, does not confirm the genetic predisposition for the results obtained²².

However, the contributory role exerted by the HTR-A2 gene has the potential susceptibility of suicide, even without demonstrated in the study records for resources failures. Already in separate study, Turecki (1999)¹⁸ mentions the hypothesis that it is possible that genetic factors act by modulating the variability of the serotonergic system level and manifestations of impulsive and impulsive-aggressive traits, which could lead to the intensification of predisposition to suicide and other suicidal behaviors.

Intervention measures to combat suicide in children and adolescents

Suicide prevention should be prioritized in public policy and regarded as a public health issue. In general, according to the WHO (2014)²⁴ records that a person, it being of any age, commits suicide every 40 seconds in the world. And in absolute numbers, Brazil ranks as the 8th country in cases of suicide. But should not be discarded to prevent child suicide, which has a tendency to growth according to data from the violence map, the Ministry of

Health.

The main challenges for the prevention of suicide, according to the World Health Organization (2006)²³ is the identification of people at risk and that it's vulnerable, to understand what factors influence the self-destructive behavior, and structure effective interventions.

Among several factors, according to World Health Organization (2000)¹, suicidal behavior can be prevented in children and adolescents by installing protective factors, removal of risk factors and avoid stressors those with greater predisposition and living in conflict and risk situations. Protective factors are needed as a good family standard, in order to have the support and greater relationship, community involvement, social integration, and access to mental health care, cultural factors and sociodemographic, comprising social integration through participation in sports clubs and activities as well as good relationships with schoolmates and teachers, and accept help from relevant people. Still, the risk factors and situations, such as personal loss, abuse, social stress, idiosyncratic behaviors, lack of impulse control, among others, should be identified so that there is an intervention. In addition, the identification school students in conflict and possible suicide risk is essential, by identifying suffering, which appears due to the lack of interest in usual activities, general decline in the notes, decreased effort, misconduct in classroom and unexplained absences and / or repeated. Must be evaluated, so the risk of suicide by the finding of previous attempts, depression and risk situations. Thus, after identifying child or adolescent risk behavior for a suicidal act it is necessary to provide psychological help and refer to treatment those who have psychiatric disorders.

According to the Ministry of Health of Brazil (2011)², some actions cannot be made before a suicidal behavior, among them, one should not ignore the situation, trying to get rid of the problem, leave the person alone, give false assurances and sworn to secrecy. Counseling is also an appropriate intervention for children and adolescents who have suicidal behavior which also involves the family context, as well, according to WHO (2006)²³ should be prioritized in the cognitive treatment behaves and mental capacity to face problems. Thus, we seek an improvement in self-esteem through the identification of involved emotional problems, self-understanding, behavior change and still prioritize better social interaction.

Therefore, for the prevention of suicide it is necessary to involve a variety of activities, including a structured family that allows the child a good education, family counseling, treatment of mental disorders, environmental control of risk factors and community education. The community of effective education allows access to knowledge to understand the causes of suicide and prevention measures and treatment of trigger mental disorders.

4. CONCLUSION

The attempted suicide in children and adolescents is not always taken seriously, it is interpreted as a way to draw attention and unimportant for family members who do not provide necessary psychological care. Although child suicide is rarely discussed in the literature, it is extremely important for both the family and for public health, because this is an increasingly important issue. This is due to the fact that the concept of death for children's thinking in some cases is seen as reversible or a kind of sleep. The act of killing is gradually understood realistically, as the child becomes a teenager, in which there is a cognitive maturation. Thus, the purpose of causing his own death is understood as a resolute alternative to escape the anguish, dissatisfaction and conflict situations that feel unable to cope and this act can be understood according to their conception of death.

Thus, some individuals with genetic aspects or depressive symptoms are more likely to cause death. Furthermore, the emergence of a family or psychosocial conflict lifelong triggering may be a risk factor. Thus, there must be intervention by health professionals so you can reduce risk factors and increase children and adolescents' protective factors from the moment there is suspicion and identification of suicidal ideation or impulsive and aggressive behavior. Yet, the construction and maintenance of a well-structured family and the relationship with parents and children confident are essential for good personal and interpersonal development of an individual, making its safe and with good capacity for emotional regulation basis.

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