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Original Research Article

Epidemiological Situation of Mucocutaneous Leishmaniasis in Yemen: A Descriptive Study in the Period from January 2017 to December 2022

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Background: Cutaneous leishmaniasis (CL) is endemic in all regions of Yemen, but the true incidence of the disease is not well known. Its burden is underestimated because many cases are not registered. The disease needs careful diagnosis as its manifestations overlap with many other conditions.

Objective: To determine the epidemiological situation of mucocutaneous leishmania in Yemen during the period from January 2017 to December 2022.

Results: The study included 3306 cases of CL. Males represented 60% (n=1984). Patients under 5-year-old accounted for 13% (n=430), those between 5 and 15 years accounted for 31% (n=1024), and those above 1 5 years represented 56% (n[e]1 852).

Regarding annual rate of cases registered through 6 years; from 2017 to 2022, they were distributed as follows: 17.2% (n=567), 19.9% (n=657), 14.2% (n 470), 12.9% (n=425) 18% (n=597), and 17.8% (n=590) respectively. The load of cases was concentrated in Sana'a Governorate (28.2%) and the Secretariat (21.7%), followed by Thamar (8.9%), Amran (7.8%), Ibb (5%), Hajjah (4.2%), Almahweet (4%), Taiz (3.4%), Albaidaha (3.1 %), Raymah (3.1 %), Aljawf (2.9%), and Aldhale'a (2.5%). Most patients (97.5%; n=3225) presented by cutaneous lesions while 2.5% (n=81) had mucocutaneous lesions. In regard to phenotype, 52% (n=1719) of cases presented with ulcerative crusty lesions, 20.4% (n=675) presented as papulonodular, 12.2% (n=402) presented as plaques, 9.4% (n=311) presented as impetigo form, and 2.5% (n=81) presented as mucocutaneous.

Conclusion: Cutaneous leishmaniasis have been registered in almost all governorates and concentrated in northwest and central region of Yemen. An effective strategy for the control of leishmaniasis should be adopted by the national health authorities.

Key word: Cutaneous Leishmania, Sand fly, Neglected disease, Skin disease, Yemen

Introduction

Cutaneous leishmaniasis (CL) is a complex entity representing a significant public health problem in many countries including the WHO Eastern Mediterranean Region. Several epidemiological, parasitological and clinical aspects pose a challenge for the management and control of the disease [1,2]. It is a potentially severe and disfiguring disease and stems for psychological problems and stigmatization [3,4]. Globally, CL is currently endemic in 88 countries. An estimated 500000-1000000 new cases occur annually, but only a small fraction of cases (19%-37%) is actually reported to health authorities. CL principally affects poor populations. Outbreaks can occur anywhere, in both urban and rural areas, and is sometimes seen in refugee camps or among internally displaced populations. It predominates in the Eastern Mediterranean region, which accounts for 80% of the CL cases reported worldwide [1,5,6]. Leishmaniasis is caused by a protozoa parasite from over 20 Leishmania species. Over 90 sandfly species are known to transmit Leishmania parasites. Mucocutaneous is the most disfiguring form which invades the mucous membranes of the upper respiratory tract, causing gross mutilation as it destroys the soft tissues of the nose, mouth and throat. Patients with this form of the disease may also suffer from discrimination and prejudice [6]. Early diagnosis and effective prompt treatment reduce the prevalence of the disease and prevent disabilities and death. Studies from Yemen proved that the disease is endemic in all regions [7-15]. Majority of CL patients in Yemen are reported from rural areas [9]. The environmental and housing conditions in these areas are the important risk factors for Leishmania spread [7,12,13,15]. In Yemen, CL is a major public health problem that leaves a mutilating scar triggered by untreated disease or corrosive chemicals practiced by some traditional healers [9]. Although some studies were conducted, the subject has not received enough investigation, and there is still a wide area for more epidemiological and clinical studies on this subject. This gap makes a reasonable rationale to conduct this study to determine epidemiological situation of mucocutaneous leishmania in Yemen during the period from January 2017 to December 2022.

Materials and Methods

This retrospective, registry-based, and cross-sectional descriptive study was conducted in Yemen during the period from January 2017 to December 2022. The data were obtained from the National Program of Leishmania Control in Al-Gomhouri Teaching Hospital in Sana'a. Al-Gomhouri Teaching Hospital is one of the accredited centers for board training. Additional data were obtained from the National Center of Disease Control and Surveillance in the Ministry of Public Health and Population.

Inclusion criteria: All patients who have been diagnosed and documented in the registry book as cases of cutaneous or mucocutaneous leishmaniasis, of both genders, at any age encountered during the period of data collection.

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Exclusion Criteria: Pure visceral leishmania cases and cases with incomplete data were excluded from the study.

Tool of Data Collection: For data capture, a checklist was developed by the researchers relying on study objectives and on data availability in the registry of leishmania. The list included demographic data (age, gender, and resident governorate), year of registration, duration of lesions, clinical phenotype, anatomical sites of lesions, result of smear examination, and treatment method.

Data Analysis: SPSS version 23, IBM Corp. was used for data processing and analysis. Data were described by frequencies and percentages. Tables and graphs were used to display data. Chi square test was applied to find association between variables, and the test was considered to be significant when alpha error (p value) less than 0.05.

Results

This study included 3306 cases of CL. Males represented 60% (n=1984), while females represented 40% (n=1322), with males to females ratio (1.5:1) as shown in Table 1.

Table 1: Distribution of the cases according to gender

Gender	Number	Percent
Males	1984	60%
Females	1322	40%

Figure 1 shows that many of the cases, (n=1852), were in the age group more than 15 years, 31% (n=1024) were in the age group between 5 and 15 years, while the cases under 5 year-old accounted for (n=430) only.

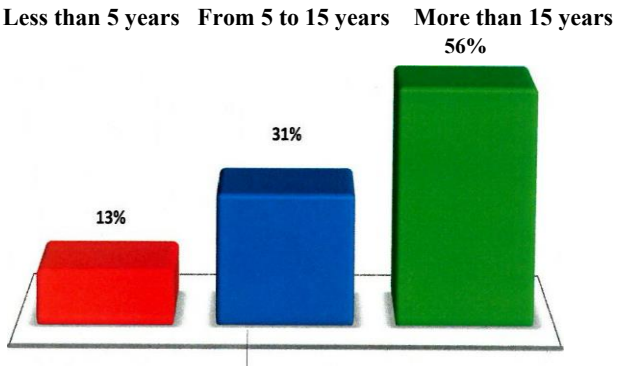

Figure 1: Distribution of the cases according to age

The percentage and number of registered cases through 6 years; from 2017 to 2022 was as follows: 17.2% (n=567), 19.9% (n=657), 14.2% (n=470), 12.9% (n=425) (n=597), and 17.8% (n=590) respectively. More specifically, the highest rate (19.9%) was registered in 2018, while the lowest rate (12.9%) was registered in 2020 Table (2).

Table (2): Distribution of the cases according to year of registration

Year	Number	Percent
2017	567	17.2%
2018	657	19.9%
2019	470	14.2%
2020	425	12.9%
2021	597	18%
2022	590	17.8%
Total	3306	100%

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Table 3: Distribution of the cases according to governorate and gender

Governorate	Males	Females	Total
Sana'a Governorate	400 (20.2%)	533 (40.3%)	933 (28.2%)
Amanah (Sana'a Capital)	540 (27.2%)	179 (13.5%)	719 (21.7%)
Thamar	200 (10.1%)	94(7.I	294 (8.9%)
Amran	169 (8.5%)	89 (6.7%)	258 (7.8%)
Ibb	122 (6.1%)	44 (3.3%)	166 (5.0%)
Hajj ah	55 (2.8%)	84 (6.4%)	139 (4.2%)
Almahweet	84 (4.2%)	47 (3.6%)	131 (4.0%)
Taiz	64 (3.2%)	50 (3.8%)	114 (3.4%)
Albaidaha	74 (3.7%)	30 (2.3%)	104 (3.1%)
Raymah	66 (3.3%)	36 (2.7%)	102 (3.1%)
Aljawf	51 (2.6%)	45 (3.4%)	96 (2.9%)
Aldhale 'a	47 (2.4%)	35 (2.6%)	82 (2.5%)
Mareb	35 (1.8%)	21 (1.6%)	56 (1.7%)
Sa'adah	39 (2.0%)	12 (0.9%)	51 (1.5%)
Alhodaidah	19 (1.0%)	20 (1.5%)	39 (1.2%)
Hadramout	9 (0.5%)	2 (0.2%)	11 (0.3%)
Lahj	6 (0.3%)	o (0.0%)	6 (0.2%)
Abyan	3 (0.2%)	o (0.0%)	3 (0.1%)
Aden	1 (0.1%)	1 (0.1%)	2 (0.1%)

t

Table 3 show that The load of cases was concentrated in Sana'a Governorate (28.2%) and the Secretariat (21.7%), followed by Thamar (8.9%), Amran (7.8%), Ibb (5%), Hajjah (4.2%), Almahweet (4%), Taiz (3.4%), Albaidaha (3.1%), Raymah (3.1 Aljawf (2.9%), and Aldhale'a (2.5%). Lower rates of cases were registered in the governorates of Mareb, Sa'adah, Alhodaidah, Hadramout, Lahj, Abyan, and Aden (less than 2% each). Males have higher rates than females in all governorates except in Sana'a Governorate, Hajjah, and Aljawf where females outnumbered males (p value <0.0001).

Clinical form of leishmania in this study showed that 97.5% (n=3225) were cutaneous, while 2.5% (n=81) were mucocutaneous lesions Figure 2.

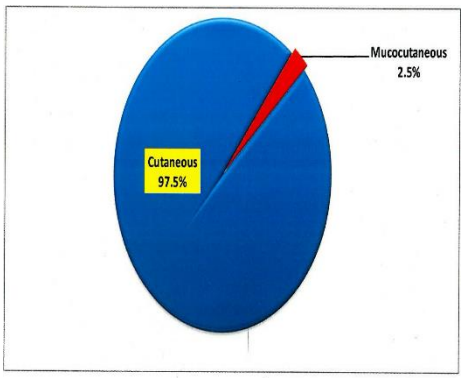

Figure 2: Distribution of the cases according to clinical form

Phenotype of the lesion showed that 52% (n=1719) of cases presented with ulcerative crusty lesions, 20.4% (n=675) presented as papulonodular, 12.2% (n=402) presented as plaques, 9.4% (n=311) presented as imptigoform, and 2.5% (n=81) presented as mucocutaneous. Other less common types were eczematiformerysipeloid, Verrucous, psoriasiform, and pseudotumoral Figure 3.

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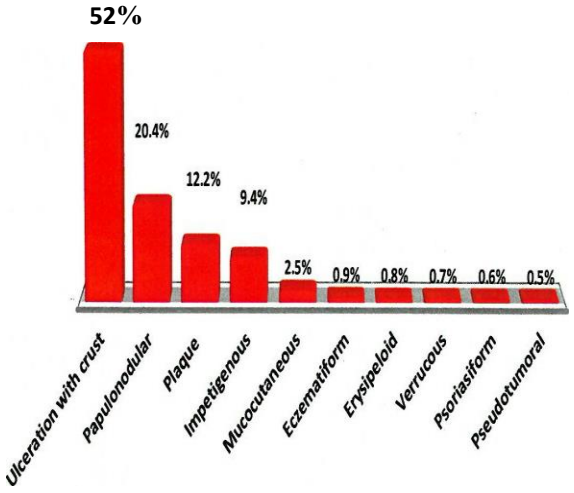

Figure 3: Distribution of the cases according to phenotype of the lesion

Duration of the lesion showed that 63.9% (n=2113) of cases presented to seek for medical help around 6 months of disease onset, and 31.3% (n=1034) of cases presented between 6 - 12 months. However, minority of the cases, which represented 4.8% (n=159), came after one year from disease onset.

Table 4: Distribution of the cases according to duration of the lesion

Duration	Number	Percent
Less than 6 Months	2113	63.9%
From 6 months to 12 months	1034	31.3%
More than 1 year	159	4.8%
Total	**3306**	**100%**

Face was the common site for lesions in a rate of 72.6% (n=2402), followed by upper limb, then by lower limbs in rates of 14.7% (n=485), and 8% (n=263) respectively. Lesions in multiple sites occurred only in 2% (n=156) of Cases Figure 4.

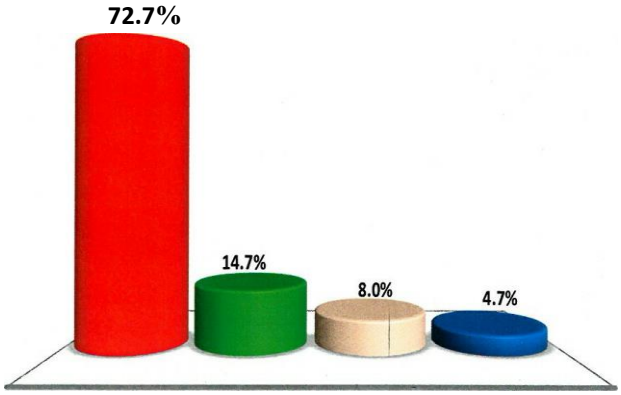

Figure 4: Distribution of cases according to anatomical site

Smear results showed that smear is positive for leishmania parasite. The histopathological examination was done for 2964 (89.7%) of cases. For the remaining cases, no confirming smear was performed and the diagnosis was made only clinically.

Table 5: Distribution of cases according to smear results

Smear results	Number	Percent
Positive	2964	89.7%
Not done	342	10.3%
Total	3306	100%

In terms of the type of treatment the results disclosed that treatment was mainly systemic for 91.6% (n=3029) of cases, while local treatment was given for only 8.4% (n=277) of them. The most frequently drug used is pentostam. Other drugs are itraconazole and ketoconazole, in addition to cryotherapy.

Table 6: Distribution of cases according to type of treatment

Type of treatment	Number	Percent
Systemic	3029	91.6%
Local	277	8.4%
Total	3306	100%

Regarding the association between gender and other variables (clinical forms, and year of registration), the results revealed no significant association (each p value >0.05).

Table 7: Association between gender, age, duration, clinical form, and year of lesions

Variable / Gender	Males	Females	P value*
Ears			
Less than 5 ears	232 11.7%	198 (15.0%	<0.001 **
From 5 to 15 ears	589 29.7%)	435 32.9%	
More than 15 ears	1163 (58.6%)	689 52.1%	
Total	1984 100%	1322 100%	
Duration			
Less than 6 months	1299 (65.5%)	814 (61.6%)	<0.001 **
From 6 months to 12 months	575 (29.0%)	459 (34.7%)	
More than 1 year	110 (5.5%)	49 (3.7%)	
Total	1984 (100%)	1322 (100%)	
Clinical form			
Cutaneous	1940 (97.8%)	1285 (97.2%)	0.290
Mucocutaneous	44 (2.2%)	37 (2.8%)	
Total	1984 (100%)	1322 (100%)	
Years			
2017	331 (16.7%)	236 (17.9%)	0.339
2018	392 (19.8%	265 (20.0%	
2019	280 (14.1%)	190 (14.4%)	
2020	268 13.5%)	157 11.9%)	
2021	374 18.9%)	223 (16.9%)	
2022	339 17.1%)	251 19.0%	
Total	1984 100%)	1322 100%)	

* Pearson Chi square was applied.

** Significant p value at level of <0.001.

Discussion

CL is endemic in many regions, including central Asia, the Middle East, southern Europe, and Africa. It also appears to be endemic in all regions in Yemen [7]. This study was carried out to determine epidemiological situation of mucocutaneous leishmania in Yemen over a period of 6 years; from January 2017 to December 2022. It included 3306 cases of CL. Males represented the majority (60%), with males to female's ratio 1.5:1. This rate is close to that reported by Khatri et al., as 63.1% of their patients were males and 36.9% were females [8]. Some other studies also reported male predominance, which may be explained by their higher exposure to vector when working outside [6,9]. Nonetheless, some studies like the one by Muthanna et al. reported that both males and females were infected at a similar rate (51% vs. 49%) respectively. On the other hand, Al-Kamel reported a female predominance of CL (32.9% of adult females vs. 9.9% of adult males) [10]. It has been also speculated that much of the observed excess risk in adult females may derive from habitual gender-specific occupational roles as most of women work in agriculture and animal care, and are responsible for procuring water, especially at dusk and in the early morning, which increases their exposure to sandfly bites [10]. The results of this study revealed that majority of the cases (56%) were in the age group more than 15 years, 31% were in the age group between 5 and 15 years, while the cases under 5 year-old accounted for 13% only. These findings are consistent with previous studies findings [11,12,13]. Some studies found that younger individuals are affected more than others, such as the study by Khatri et al. that reported a ranged of patients' age from 8 months to 80 years with a median of 15 years [8], which is in agreement with the findings of the current study. The results of the present study also disclosed a stable trend with some fluctuations in annual number of CL cases registered in the period of 6 years; from 2017 to 2022 as follows: 17.2%, 19.9%, 14.2%, 12.9% 18%, and 17.8% respectively. The highest rate (19.9%) was registered in 2018, while the lowest rate (12.9%) was registered in 2020.

According to results of this study, the load of registered cases was concentrated in Sana'a governorate (28.2%) and the Amanah (21.7%), followed by the governorates of Thamar (8.9%), Amran (7.8%), Ibb (5%), Hajjah (4.2%), Almahweet (4%), Taiz (3.4%), Albaidaha (3.1%), Raymah (3.1 %), Aljawf (2.9%), and Aldhale'a (2.5%). The lower rates of cases were registered in the governorates of Mareb, Sa'adah, Alhodaidah, Hadramout, Lahj, Abyan, and Aden (less than 2% each). In a study in northwestern Yemen by Khatri et al. the cases were distributed between Hajjah (83.0%), Amran (9.3%), Sa'adah (3.4%), Sana'a (1.2%), Alhodaidah (1.0%), Taiz (0.6%), Almahweet (0.5%), Raymah (0.3%), Ibb (0.3%), Thamar (0.2%), Aljawf (0.1%), and Lahj (0.1%). The study conducted by Al-Qubati et al. in a private clinic in Taiz reported somewhat different distribution as more than half of the patients (69.5%) were residing in highlands in the southwest and central governorates: Taiz (48%), Ibb

(21.5%), Lahj (24.3%), Aldhale'a (2.1%), Abyan (0.7%). Less patients, (3.5%), were from the northern governorates: Sana'a (0.7%), Thamar (1.4%) and Raymah (1.4%) [11].

The results of this study revealed that 97.5% of lesions were cutaneous, while only 2.5% were mucocutaneous lesions, which is consistent with results of Khatri M. et al., who observed mucosal lesions in 3.1% of their patients [8]. Other studies reported a minority of mucosal lesions. Muthanna, for example, observed that 10.6% of lesions developed in lips, nose, eyelids and ear. Lesions on lips resulted in diffuse lip swelling, localized lip swelling, and localized erosions and ulcerations. CL on ear and eyelid resembled a furuncle. On the nose, lesions caused extensive erosions with dry a serous crusting resembling lupus pernio or impetigo contagiosum [11]. Lesions on mucous membrane may have wide mimickers as chronic actinic cheilitis, chronic granulomatous cheilitis and squamous cell carcinoma [11]. Unexpectedly, Al-Kamel reported that MCL was the most predominant form (49.3%) in the central areas of the country, which is a matter of serious concern; no similar situation has been previously addressed in Yemen [10]. The results of this study demonstrated that in 52% of the cases presented with ulcerative crusty lesions, 20.4% presented as papulonodular, 12.2% presented as plaques, 9.4% presented as imptigoform, and 2.5% presented as mucocutaneous. Other less common types were eczematiform, erysipeloid, verrucous, psoriasiform, and pseudo tumoral.

Phynotypic appearance is varying from a study to another. Khatri et al. found that 58.5% of the cases were noduloulcerative lesions, 16.9% ulcerative plaques, 13.6% indurated plaques, 7.3% nodular lesions, 4.2% papular lesions, 0.7% diffuse induration, 0.1% diffuse induration with ulceration, 0.5% induration of the whole face, 0.7% thick verrucous plaque, 0.5 scaly plaque, 0.1% large lichenoid plaque, and 0.3% subcutaneous nodular dissemination lesions. Besides, they classified lesions as dry (97.9%) and wet (2.1%). Muthanna et al. reported that CL displayed a wide spectrum of clinical phenotypes which included centrally ulcerated nodules in 35%, in which some patients had slightly eroded papules and nodules, while ulcers were recognized in 21.4% [11]. They also reported that atypical phenotypes constituted 12%. These were in the form of well-defined and large ulcerative plaques which were primary lesions in some cases, but were sometimes secondary to corrosive substances commonly applied by traditional healers to treat leishmania in rural areas, resulting in large ulcers with thick adherent crusts [11]. Diagnosis is challenging in atypical and unusual forms which need a skin biopsy to confirm the diagnosis and ruled out other diseases [14].

Based on the current study findings, 63.9% of the cases presented to seek for medical help around 6 months of disease onset, and 31.3% of the cases presented between 6-12 months. However, in a minority of the cases (4.8%), the patients came after one year of disease onset. Similarly, Al-Kamel reported that most patients presented later than 4 months after

disease onset [10]. Another study reported a quite similar duration for the disease which ranged from 3 weeks to 12 years (median duration: 4 months), in which 4.6% of the patients reported disease duration exceeded one year [8].

The results of the present study revealed that face was the common site for lesions in a rate of 72.6%, followed by upper limb, then by lower limbs in rates of 14.7% and 8%, respectively. Lesions in multiple sites occurred only in 2% of cases. These findings are consistent with the findings of Muthanna et al. in the sense that most lesions were on the face (58%), followed by upper limbs (22.6%), lower limbs (18%) and lastly on the trunk [11]. Similarly, Al-Kamel [10], Khatri et al. [8], and Alharazi et al. [9] reported that most of patients had a single lesion which usually appears in the face.

According to the results of this study, all confirming smears taken from lesions were positive for leishmania parasite. The histopathological examination was done for 89.7% of the cases. For the remaining cases, no confirming smear was performed and the diagnosis depended only on clinical suspicion. No data was available in the registry on types of leishmania species. According to Khatri et al. L. tropica was the dominant causative species accounting for 95% of the cases, while L. donovani and L. infantum represented 4.1%, and 1.9% for atypical molecular patterns [8]. In the southwestern highlands at Lahj and Taiz governorates, Mogalli et al. [15] and Alharazi et al. [9] reported that CL was endemic disease mainly in the rural regions. However, in 1989, Rioux et al. reported that L. donovani and L. infantum were the causative species for VL and L. tropica was the causative agent for CL in Tehama city in Yemen [16].

The results of this study unveiled that treatment was mainly systemic for 91.6% of the cases, while local treatment was given for only 8.4% of the cases. The most common available drug used by the program of leishmania control was pentostam, and the other less commonly used drugs were ketoconazole and itraconazole. In a previous study, 55.9% of patients had tried traditional and herbal forms of treatment before seeking medical advice, and some of them had developed unnecessary complications [10]. Substances such as animal saliva (e.g. chameleon), herbal (e.g. cactus) recipes, corrosive chemicals, and topical steroids had been used [10]. Inherited customs, poverty, and a perceived inability to obtain a proper diagnosis and treatment were among the risk factors described [10]. Most of Yemeni people, especially in rural areas, do not have easy access to local health services which encourage patients to use hazardous methods of traditional treatment [17].

Conclusion

CL is endemic in Yemen, and its incidence has increased recently because of the lack of vector control attributable to the unstable sociopolitical situation and devastated health system. The disease is distributed in all ages with predilection to younger individuals and male gender. Cases have been registered in

almost all governorates and concentrated in northwest and central region of the country.

The disease is mainly manifested as cutaneous lesions but, in some cases, it involves mucosal areas in mouth and nose. Lesions take a chronic course and mostly appear as a single lesion in face and other exposed parts.

It is recommended to increase awareness among medical personnel to be highly suspicious on this neglected disease which may be confused with a wide variety of skin lesions. General practitioners and health workers in primary health centers should have the ability to identify of the common presentations of CL since the majority of patients, especially in rural areas, do not have access to dermatologists.

It is also recommended to increase community awareness about the importance of early seeking for medical help to avoid unwanted sequelae as disfigurement and stigma.

An effective strategy for the control of leishmaniasis should be adopted by the national health authorities.

Further studies are recommended for updating epidemiological aspects and for identifying causative species and new genotypes to provide the necessary information for control programs.

References

1. World Health Organization. Leishmaniasis Geneva: WHO; 2023 [cited 2023]. Available from: https://www.who.int/news-room/fact-sheets/detail/leishmaniasis.
2. Salam N, Al-Shaqha WM, Azzi A. Leishmaniasis in the Middle East: incidence and epidemiology. Plops neglected tropical diseases. 2014;8(10): e3208.
3. G6mez LJ, van Wijk R, van Selm L, Rivera A, Barbosa MC, Parisi S, et al. Stigma, participation restriction and mental distress in patients affected by leprosy, cutaneous leishmaniasis and Chagas disease: a pilot study in two co-endemic regions of eastern Colombia. Transactions of The Royal Society of Tropical Medicine and Hygiene. 2020;114 (7):476-482.
4. Yanik M, Gurel MS, Simsek Z, Kati M. The psychological impact of cutaneous leishmaniasis. Clinical and experimental dermatology. 2004;29(5):464-467.
5. Al-Kamel MA. Stigmata in cutaneous leishmaniasis: Historical and new evidence-based concepts. Our Dermatology Online. 2017;8(1):81.
6. World Health Organization. Working to overcome the global impact of neglected tropical diseases: first WHO report on neglected tropical diseases: World Health the Organization; 2010.
7. Khatri ML, Haider N, Di Muccio T, Gramiccia M. Cutaneous leishmaniasis in Yemen: clinicoepidemiologic features and a preliminary report on species identification. International journal of dermatology. 2006;45(1):40-45.
8. Khatri ML, Di Muccio T, Fiorentino E, Gramiccia M. Ongoing outbreak of cutaneous leishmaniasis in northwestern Yemen: clinic epidemiologic, geographic, and taxonomic study. International journal of dermatology. 2016;55(11): 1210-1218.
9. Alharazi T, Alasbahi I, SaifN. Study on cutaneous leishmaniasis among clinically suspected patients in Taiz City, Taiz

governorate, Yemen. Int J Trop Dis Health. 2016;19(2):1-5.

10. Al-Kamel MA. Leishmaniasis in Yemen: a clinic epidemiological study of leishmaniasis in central Yemen. International journal of dermatology. 2016;55(8):849-855.
11. Muthanna AM, Malhomme HD, Schwartz RA, Al-Qubati YA. The clinical phenotypes of cutaneous leishmaniasis in central and Southwest Regions of Yemen. Indian Journal of Dermatology.2022;67
12. Alkulaibi MM, Suleiman AM, Gasim Khalil EA, Al-Garadi MA. Prevalence of cutaneous leishmaniasis in Western Highlands in Yemen. Journal of tropical medicine. 2019;2019.
13. El Sawaf BM, Kassem HA, Mogalli NM, El Hossary SS, Ramadan NF. Current knowledge of sand fly fauna (Diptera: Psychodidae) of northwestern Yemen and how it relates to leishmaniasis transmission. Acta Tropica. 2016; 162:11-19.
14. Handler MZ, Patel PA, Kapila R, Al-Qubati Y, Schwartz RA. Cutaneous and mucocutaneous leishmaniasis: differential diagnosis, diagnosis, histopathology, and management. Journal of the American Academy of Dermatology. 2015;73(6):911-926.
15. Mogalli NM, El Hossary SS, Khatri ML, Mukred AM, Kassem HA, El Sawaf BM, et al. Clinicoepidemiologic pattern of cutaneous leishmaniasis and molecular characterization of its causative agent in Hajjah governorate, northwest of Yemen. Acta Tropica. 2016;163:130-134.
16. Rioux J, Daoud W, Pratlong F, El Kubati Y, Moreno G, Rageh H, et al. Les complexes Leishmania donovani s. st. Leishmania tropica et Leishmania major en République Arabe du Yémen. Leishmania: taxonomie-phylogenese Applications eco-epidemiologiques Montpellier: Institut Mediterran en d'Etudes Epidemiologiques et Ecologiques. 1986:357-363.
17. Dureab F, Hussain T, Sheikh R, Al-Dheeb N, Al-Awlaqi S, Jahn A. Forms of health system

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Original Research Article

Efficacy and Safety of Intravitreal Triamcinolone Injection in the Treatment of Cystoid Macular Edema

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Abstract

Cystoid Macular Edema (CME) is a major concern for global vision health, often resulting in distorted vision due to fluid accumulation in the macula. Intravitreal Triamcinolone (IVT) injections have emerged as a promising treatment, reducing macular thickening and improving visual acuity. This study aimed to assess the efficacy and safety of IVT injections in treating CME triggered by various diseases and improving visual acuity. The study included 20 eyes of 12 patients with CME associated with conditions such as diabetic mellitus type II, pseudophakia, central retinal vein occlusion (CRVO), Aphakia, retinitis pigmentosa, and panuveitis. A reduced dose of IVT was administered to mitigate corticosteroid-related complications. Each patient received a single IVT injection of triamcinolone acetate. The initial findings indicated the efficacy of IVT injections in managing CME, particularly in cases related to diabetic retinopathy, uveitis, and central retinal vein occlusion. The study provided valuable insights into the efficacy of IVT injections in managing CME across diverse disease conditions, with observed improvements in visual acuity and resolution of CME.

Keywords: Macular Edema, Steroids, Triamcinolone

Introduction

Cystoid Macular Edema (CME) is a significant cause of vision loss globally, characterized by fluid accumulation in the macula, leading to swelling and distorted vision [1]. Various conditions, including diabetic retinopathy, retinal vein occlusion, and post-cataract surgery inflammation can result in CME [2]. The treatment of CME is a complex and challenging task, requiring effective interventions to manage the underlying disease while reducing macular edema. In recent years, Intravitreal Triamcinolone (IVT) injections present a promising treatment, but their efficacy across disease conditions necessitates further exploration [3]. Triamcinolone is a corticosteroid that has been shown to have potent anti-inflammatory and anti-permeability effects, thereby reducing macular thickening and improving visual acuity [4]. However, while the efficacy of IVT injections in managing CME associated with certain conditions like diabetic retinopathy has been well-documented, its efficacy across different disease conditions is a topic that warrants further exploration [5]. IVT injections have been a promising solution, but further research is needed to see whether they are effective for a variety of medical disorders. As of right now, several studies have indicated that IVT injections hold promise for treating CME, which can result from several disorders. Further research should concentrate on maximizing the frequency and dosage of IVT injections for various disease states as well as investigating the possibility of combination therapies to improve treatment outcomes [6-8]. Thus, a less dose of IVTA (2mg/0.05 ml) was used in this study instead of (4mg/0.1 ml) to decrease complications of corticosteroid such as increasing Intraocular Pressure (IOP).

Accordingly, this study aims to explore the efficacy and safety of IVT injections in the treatment of CME and improving visual acuity across various disease conditions.

Materials and Methods

This study was a prospective, non-randomized, interventional clinical study conducted between December 2020 and October 2022 to assess the efficacy and safety of IVT injections in treating CME triggered by various diseases and improving visual acuity and IOP. Less dose of IVTA (2mg/0.05 ml) was used instead of (4mg/0.1 ml). TA is a synthetic steroid of the glucocorticoid family that has molecular weight of 434.50 and its empirical formula is $C_{24}H_{31}FO_6$. It is commercially available as an ester, a white powder only minimally soluble in water but soluble in alcohol and chloroform, Kenacort-A (Bristol-Myers Squibb, New York, USA) [9].

This study included 20 eyes of 12 patients (10 men, 2 women) ranging in age from 28 to 54 years with cystoid macular edema (six patients have diabetic mellites type II, two have pseudophakic, one has central retinal vein occlusion (CRVO), one has Aphakia, one has retinitis pigmentosa, and one has panuveitis). All treated eyes received an intravitreal injection dose of IVTA (2mg/0.05 ml) instead of (4mg/0.1 ml) of triamcinolone acetonide Kenacort-A (40 mg/mL) (Bristol-Myers Squibb, New York, USA). Following the tenets of the

Declaration of Helsinki, the study received approval from the Magrabi Eye Hospital, Yemen. All potential risks and possible benefits of either treatment were clearly explained to patients and written informed consent was obtained from all patients.

Inclusion Criteria

Inclusion criteria included patients with CMO of diabetes mellitus (any subtype) with diabetic retinopathy, pseudophakic, CRVO, Aphakia, retinitis pigmentosa, and panuveitis.

Exclusion Criteria

Exclusion criteria were as follows: 1) systemic used steroids within 90 days; 2) intraocular hypertension (intraocular pressure [IOP] >21 mmHg); 3) history periocular/intraocular inflammation; 4) Intravitreal ante-vascular endothelial growth factor and corticosteroid injection; 5) history of vitrectomy.

Procedure

Baseline clinical examination was performed, including best corrected Snellen visual acuity (VA), IOP examination slit lamb examination, standard fundus fluorescein angiography, and ocular coherent tomography. Each patient received a single intravitreal injection of triamcinolone acetate of 2 mg/0.05 mL (Kenacort-A (Bristol-Myers Squibb, New York, USA) after topical lidocaine 1%, topical povidone iodine 5%. Injections were given via 30-gauge needles through the inferotemporal pars plana, 4 mm from the Limbus. Intraocular pressure was checked following the injection.

Baseline Evaluation

On initial examination, best corrected visual acuity (BCVA), central macular thickness (CMT), IOP examination, and slit lamp were performed. Detailed clinical history was likewise recorded. Trained optometrists masked to both groups measured the BCVA using the E-ETDRS method as reported by Beck et al. [10, 11]. IOP was recorded using Goldmann applanation tonometry. IOP >21 mmHg was defined as intraocular hypertension. Spectral domain optical coherence tomography (SD-OCT;3D OCT-2000, Topcon Corporation, Japan) was used to detect the CMT [11].

Examination and Follow-up Evaluation

The efficacy of intravitreal injections in managing CME across different disease conditions was evaluated through a series of assessments. These assessments were performed at specific time points, including 1st day preoperatively, 1st week, and 1st, 2nd, 3rd, and 6th months after surgery. The assessments included Best Corrected Visual Acuity (BCVA), slit lamp examination, measurement of IOP, fundus photographs, and optical coherence tomography. Postoperative adverse events, such as intraocular hyper-tension, secondary ocular infections, endophthalmitis, non-infectious inflammation, retinal detachments, and conjunctival hemorrhage were also assessed.

Results

Demographics of Patients

A total of 20 eyes of 12 patients with CME were included in this study. The patients consisted of 10 male and 2 women, with ages ranging from 28 to 54 years (Figure 1-a). The patients had different underlying conditions, including diabetic mellitus type II, pseudophakic, central retinal vein occlusion (CRVO), Aphakia, retinitis pigmentosa, and panuveitis (Figure 1-b).

The initial findings suggested that intravitreal (IVT) injections have been effective in managing CME, particularly in cases related to diabetic retinopathy, uveitis, and CRVO. The treatment resulted in reducing macular thickening and improving visual acuity. In some cases, the treatment led to temporary improvement, but the recurrence rate was low.

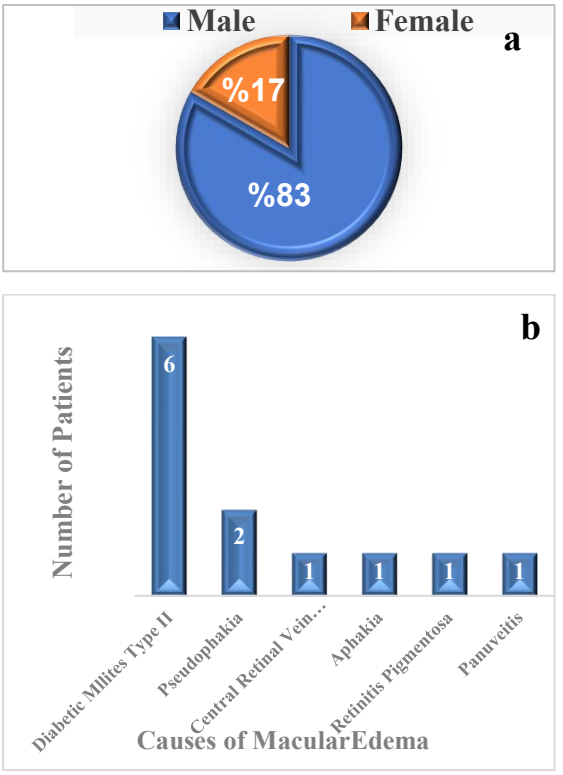

Figure 1: (a) Distribution of patients according to gender; (b) Distribution of patients according to causes of Macular Edema

Floaters in the Vitreous

Figure 2 shows that, during the first day of follow-up, all patients in the study reported seeing floaters (pieces of TA) in the vitreous. It was also observed that some patients continued to see floaters for a few days after the initial day of follow-up.

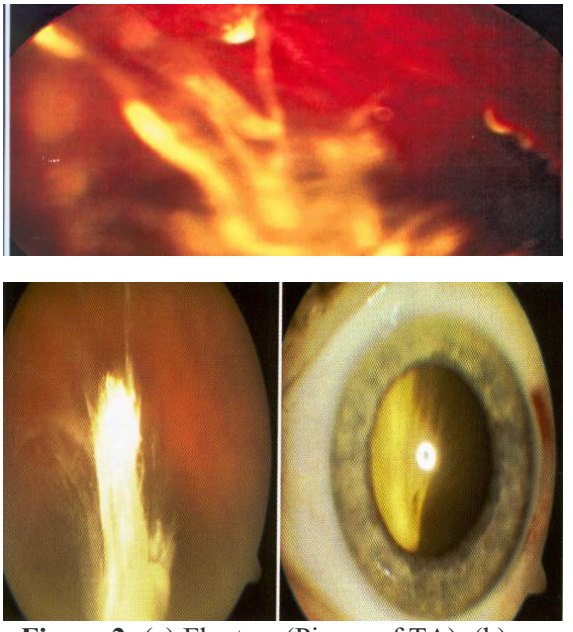

Figure 2: (a) Floaters (Pieces of TA); (b) fundus photography; (c) Slit lamp photography

Best Corrected Visual Acuity (BCVA) Improvement

Table 1 shows improvements in the best corrected visual acuity (BCVA) after the IVTA injection. The median corrected VA prior to the injection was 6/24, while the post-injection median BCVA was 6/12 at month 1 and 6/9 at month 3 for uveitis patients. The maximum improvement in BCVA was observed at month 3 in 9 cases, including uveitis, pseudophakia, diabetic mellitus type II (DM-II), and central retinal vein occlusion (CRVO). However, there was no change in BCVA in 3 cases

Table 1: Best Corrected Visual Acuity before and after the IVTA injection

Patient Number	Causes	Eye	BCVA Before IVTA	1st Week	Month 1	Month 3	Month 6
1.	**DM-II**	OD OS	6/CF2m 6/60	6/CF4m 6/24	6/CF4m 6/18	6/CF4m 6/18	6/CF2m 6/24
2.	**DM-II-**	OD OS	6/60 6/CF3m	6/36 6/CF4m	6/24 6/60	6/24 6/60	6/36 6/60
3.	**DM-II**	OD OS	6/36 6/60	6/18 6/36	6/12 6/36	6/12 6/24	
4.	**DM-II**	OD OS	6/CF2m 6/60	6/CF2m 6/36	6/CF2m 6/24	6/CF2m 6/24	6/CF2m 6/24
5.	**DM-II**	OD OS	6/CF4m 6/36	6/CF4m 6/24	6/CF4m 6/18	6/CF4m 6/24	6/CF4m 6/36
6.	**DM-II**	OD OS	6/CF2m 6/CF4m	6/CF2m 6/60	6/CF4m 6/36	6/CF4m 6/24	6/CF4m 6/24
7.	**CRVO**	OD	6/60	6/24	6/18	6/12	6/18
8.	**Pseudophakia**	OD OS	6/60 6/36	6/24 6/12	6/18 6/12	6/18 6/12	6/18 6/12
9.	**Pseudophakia**	OS	6/60	6/24	6/18	6/18	
10.	**Aphakia**	OD	6/CF3m	6/CF3m	6/CF3m	6/CF3m	6/CF3m
11.	**Retinitis Pigmentosa**	OD OS	6/CF3m 6/60	6/CF3m 6/36	6/CF3m 6/36	6/CF3m 6/60	6/CF3m 6/60
12.	**Uveitis**	OD	6/60	6/24	6/12	6/9	

(patients No. 4 and 5 with DM-II OD, retinitis pigmentosa OD, and Aphakia).

Intraocular Pressure (IOP) Variation

Table 2 displays the variation in IOP before and after the IVTA injection. The mean IOP before the injection and at month 3 was 15.50 mmHg and 17.80 mmHg, respectively. On the first day after treatment, there was a temporary increase in IOP in some cases, with the maximum increase observed in patients No. 6 and 7 (30, 28, and 28 mmHg). However, the IOP decreased without treatment to 18, 17 mmHg and 16 mmHg, respectively.

Table 2: Intraocular Pressure before and after the IVTA injection

Patient Number	Causes	Eye	Before Surgery	1st day	Week 1	Month 1	Month 3	Month 6
1.	**DM-II**	OD	14	16	16	16	14	15
		OS	12	14	14	14	12	17
2.	**DM-II**	OD	15	20	17	17	15	17
		OS	17	19	17	17	17	19
3.	**DM-II**	OD	11	14	14	14	11	
		OS	13	13	15	15	13	
4.	**DM-II**	OD	15	17	17	17	15	17
		OS	18	18	18	18	18	20
5.	**DM-II**	OD	15	15	15	15	15	18
		OS	16	16	18	18	16	19
6.	**DM-II**	OD	19	30	18	18	19	19
		OS	20	28	17	17	20	20
7.	**CRVO**	OD	15	28	16	16	15	17
8.	**Pseudophakia**	OD	13	15	15	15	13	14
		OS	14	17	16	16	14	16
9.	**Pseudophakia**	OS	17	17	19	19	17	
10.	**Aphakcia**	OD	16	16	16	16	16	18
11.	**Retinitis Pigmentosa**	OD	14	14	15	15	14	15
		OS	12	12	14	14	12	13
12.	**Uveitis**	OD	15	17	15	15	15	
Mean			15.05	17.8	16.1	16.1	15.05	17.13

Discussion

The findings of the study provide valuable insights into the efficacy of the low dose of IVT injections in managing CME across different disease conditions. The results revealed that IVTA effectively improved BCVA and decreased CME across different disease during 6 months of follow-up. Comparably, Dang et al. found that 44% of patients had improved their BCVA by ten letters or more by the end of the first month following intravitreal injection, and that this benefit continued for six months without the need for further injections [11]. In addition, a relatively low percentage of patients with intraocular hypertension was reported.

According to preliminary research, IVT injections are quite successful in controlling CME, especially in situations with postoperative inflammation and diabetic retinopathy [4].

To the best of the researchers' knowledge, this is the first study conducted in Yemen on the safety and efficacy of IVTA, which may enable making wise decisions in clinical practice and properly comprehending the therapeutic effect of corticosteroids. The varying efficacy of IVT across diseases could be attributed to the unique pathophysiology of each condition. In diabetic retinopathy, inflammation drives CME, making IVT's anti-inflammatory action effective [3]. Positive results have been obtained in this study in cases including uveitis, pseudophakia, diabetic mellitus type II (DM-II), and central retinal vein occlusion (CRVO). In contrast, retinal vein occlusion involved both inflammation and ischemia, complicating the treatment outcomes, compeered to Scott et al. [12].

These results indicate that the most important feature of this study is that the use of less does of IVTA is relatively low incidence of intraocular hypertension, compeered to Dang et al. [11] who reported that elevated IOP is a common steroid-related complication, but it seems more frequent and serious after IVTA.

Intravitreal triamcinolone (4 mg/0.1 mL) was an effective treatment for inflammatory macular edema with clinical and angiographic resolution evident in all patients by 6 weeks (range 2–6 weeks), but induced ocular hypertension increases [13].

More recent steroid formulas, such as injection of the DEX implant might be more suited for slow-release device insertion or repeated injections since they have less of an impact on the IOP while still eliminating CMO [11, 13].

Limitations

The current study had the following limitations. The small sample size of 12 patients and the relatively short follow-up period of 6 months for most patients limit the generalizability of the findings. Additionally, the study did not provide information on the long-term outcomes and recurrence rates beyond the 6-month follow-up period. Further research with larger sample sizes and longer follow-up periods would provide more comprehensive insights into the efficacy and long-term outcomes of IVT injections in managing CME.

Conclusion

This study highlights the efficacy and safety of the low dose of IVT injections in managing CME, particularly in cases related to diabetic retinopathy, uveitis, and central retinal vein occlusion. The findings shed light on the occurrence of floaters, BCVA improvement, CMO relapse, and IOP variation in CME patients undergoing IVTA injections. Further research is warranted to address the limitations of the present study and explore additional factors influencing treatment outcomes in CME patients.

Conflict of Interest

The authors declare no conflict of interest.

References:

1. Yanyali A, Nohutcu AF, Horozoglu F, Celik E. Modified grid laser photocoagulation versus pars plana vitrectomy with internal limiting membrane removal in diabetic macular edema. American journal

of ophthalmology. 2005;139(5):795-801.
2. Holló G, Aung T, Cantor LB, Aihara M. Cystoid macular edema related to cataract surgery and topical prostaglandin analogs: Mechanism, diagnosis, and management. Survey of Ophthalmology. 2020;65(5):496-512.
3. Antonetti DA, Klein R, Gardner TW. Diabetic retinopathy. The New England journal of medicine. 2012;366(13):1227-39.
4. Jonas JB, Kreissig I, Degenring R. Intravitreal triamcinolone acetonide for treatment of intraocular proliferative, exudative, and neovascular diseases. Progress in Retinal and Eye Research. 2005;24(5):587-611.
5. Munk MR, Somfai GM, de Smet MD, Donati G, Menke MN, Garweg JG, et al. The Role of Intravitreal Corticosteroids in the Treatment of DME: Predictive OCT Biomarkers. International journal of molecular sciences. 2022;23(14).
6. Tariq F, Wang Y, Ma B, He Y, Zhang S, Bai L. Efficacy of Intravitreal Injection of Filtered Modified Low-Dose Triamcinolone Acetonide and Ranibizumab on Pseudophakic Cystoid Macular Edema. 2022;9.
7. Becerra EM, Morescalchi F, Gandolfo F, Danzi P, Nascimbeni G, Arcidiacono B, et al. Clinical evidence of intravitreal triamcinolone acetonide in the management of age-related macular degeneration. Current drug targets. 2011;12(2):149-72.
8. Moon J, Kim M, Sagong M. Combination therapy of intravitreal bevacizumab with single simultaneous posterior subtenon triamcinolone acetonide for macular edema due to branch retinal vein occlusion. Eye. 2016;30(8):1084-90.
9. Tao Y, Jonas JB. Intravitreal triamcinolone. Ophthalmologica Journal international d'ophtalmologie International journal of ophthalmology Zeitschrift fur Augenheilkunde. 2011;225(1):1-20.
10. Beck RW, Moke PS, Turpin AH, Ferris FL, 3rd, SanGiovanni JP, Johnson CA, et al. A computerized method of visual acuity testing: adaptation of the early treatment of diabetic retinopathy study testing protocol. American journal of ophthalmology. 2003;135(2):194-205.
11. Dang Y, Mu Y, Li L, Mu Y, Liu S, Zhang C, et al. Comparison of dexamethasone intravitreal implant and intravitreal triamcinolone acetonide for the treatment of pseudophakic cystoid macular edema in diabetic patients. Drug design, development and therapy. 2014;8:1441-9.
12. Scott IU, Ip MS, VanVeldhuisen PC, Oden NL, Blodi BA, Fisher M, et al. A randomized trial comparing the efficacy and safety of intravitreal triamcinolone with standard care to treat vision loss

associated with macular Edema secondary to branch retinal vein occlusion: the Standard Care vs Corticosteroid for Retinal Vein Occlusion (SCORE) study report 6. 2009;127(9):1115.

13. Young S, Larkin G, Branley M, Lightman S. Safety and efficacy of intravitreal triamcinolone for cystoid macular oedema in uveitis. Clinical & experimental ophthalmology. 2001;29(1):2-6.

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Original Research Article

Evaluation of Prophylactic Anticoagulants Application Practice for High-Risk Surgical Patients at Al-Thawra Hospital, Sana'a

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Abstract

Background: Through clinical practice, it has been noticed that the number of patients who had DVT and PE during their hospital admission period has increased, especially among high-risk surgical patients. Physicians may not be aware of or may not consistently use up-to-date evidence-based prevention guidelines. There is an abundance of evidence documenting the underutilization of prophylactic measures in hospitalized patients.

Objective: The study aimed to determine the percentage of prophylactic anticoagulant application for high-risk surgical patients.

Methods: A retrospective observational research approach was followed using a special questionnaire. Data were collected from files of patients with high risk for VTE who were admitted to the Orthopedic, Gynecological and Neurosurgical surgical departments at Al-Thawra hospital, Sana'a, during the period from 1/1/2014 to 31/12/2014. All selected patient's files were screened for sociodemographic characteristics, other risk factors of DVT, and medications list.

Results: A total of 99 patients files were enrolled in the study, which were divided into 33 patients for every department (Orthopedic, Gynecological and Neurosurgical). The results showed that 68% of the studied high-risk surgical patients were given prophylactic anticoagulants and the percentages of prophylactic anticoagulants application in each department (Orthopedic, Gynecological and Neurosurgical) were 60.6%, 72.7% and 69.7%, respectively.

In the Orthopedic department, 66.6% of the patients were male while in the Neurosurgical department 72.7% of the patients were male. Patients younger than 40 years old in the Orthopedic, Gynecological and Neurosurgical departments were 18.2%, 51.5% & 42.4% respectively.

Conclusion: According to the current study findings, the percentage of prophylactic anticoagulants application for high-risk surgical patient was low in comparison with that of the developed countries, such as Germany 92%, Hungary 87%, Spain 82% and Switzerland 81%.

Introduction

Venous thromboembolism (VTE), which encompasses deep venous thrombosis (DVT) and pulmonary embolism (PE), is one of the three major cardiovascular causes of death, along with myocardial infarction and stroke. VTE can cause death from PE or, among survivors, chronic thromboembolic pulmonary hypertension and post-phlebitis syndrome [1].

The annual incidence VTE following operations in the United States is estimated to 70,000 to 600,000, incurring an additional cost of approximately $12,000 per case. Pulmonary emboli can be fatal and post-thrombotic syndrome, pulmonary hypertension, and heart failure are known consequences of VTE [2].

The U.S. General Surgeon has declared that PE is the most common preventable cause of death among hospitalized patients. Medicare has labeled PE and DVT occurring after total hip or knee replacement as unacceptable "never events" and no longer reimburses hospitals for the incremental expenses associated with treating this postoperative complications. New nonprofit organizations have begun educating healthcare professionals and the public on the medical consequences of VTE, along with risk factors and warning signs [3,4].

In the absence of prophylaxis, DVT occurs approximately after 20% of all major surgical procedures and PE occurs after 1% to 2%. The prevalence of VTE is even higher in orthopedic patients; more than 50% of major orthopedic procedures are complicated by DVT and up to 30% by PE when VTE prophylaxis is not instituted[5-7].

A retrospective study was done in King Fahd General Hospital, Jeddah; Kingdom of Saudi Arabia, which concluded that VTE prophylaxis is extremely underutilized; only 44.1% of high-risk surgical patients received prophylactic antithrombotic therapy [8]. There is a gap between guidelines and practice. ENDORSE global study revealed that more than 50% of hospitalized patients should have received VTE thromboprophylaxis, but only half of them received it. The percentage of high-risk surgical patients who received prophylactic anticoagulant was 92% in Germany, 87% in Hungary, 82% in Spain, and 81% in Switzerland [9,10].

The total VTE case fatality rate in hospitals was found to be 12% and 29-34% per year. The DVT case fatality rate ranged from 1 to 10%, which is mainly due to fatal PE and is highest in those with malignancies [11].

Physicians may not be aware of, or may not consistently use, up-to-date evidence-based prevention guidelines. Since 1986, physicians have increasingly relied on the ACCP guidelines recommendations for VTE prevention. However, implementation of the recommendations has remained a challenge; there is an abundance of evidence documenting the underutilization of prophylactic measures in hospitalized patients [12].

Thus, this study aims to recognize the percentage of prophylactic anticoagulants

application for high-risk surgical patients who had been admitted to the surgical departments (Orthopedic, Gynecological/Obstetric and Neurosurgery) at Al-Thawra Hospital, Sana'a, during the period from 1/1/2014 to 31/12/2014.

Method and Tools

Study Design: This study was a retrospective observational study conducted in Al-Thawra Hospital, Sana'a. Data were collected from medical record files of High-risk patients for VTE who had been admitted to the Neurosurgical, Gynecological and Orthopedic surgical departments. A convenient sampling technique was used. The total sample size included 99 patients' file, randomly collected as 33 files from every department involved in the study.

Inclusion Criteria: Adult patients aged 18 years and above who underwent high-risk surgical operation for VTE and admitted to the Neurosurgical, Gynecological and Orthopedic surgical department at Al-Thawra Hospital, Sana'a.

Data Collection: A questionnaire was designed to collect data. All patients' files who were selected to participate in the study were screened for sociodemographic characteristics, other risk factors of DVT, and medication lists to detect the presence of prophylactic anticoagulants.

Statistical Analysis: The collected data were reviewed, coded, and analyzed using the Statistical Package of Social Sciences (SPSS) software version #. The primary outcome in this study (dependent variable) was the percentage of prophylactic anticoagulants application in high-risk surgical patients while the secondary outcome was the percentage of prophylactic anticoagulants application in each department.

Ethical Consideration: An official permission was granted by Al-Thawra hospital management to conduct this study.

Results

A total of 99 patients files were enrolled in this study, divided into 33 files from each department (Orthopedic, Gynecological and Neurosurgical). The results revealed that 68% of the studied high-risk surgical patients were given prophylactic anticoagulants.

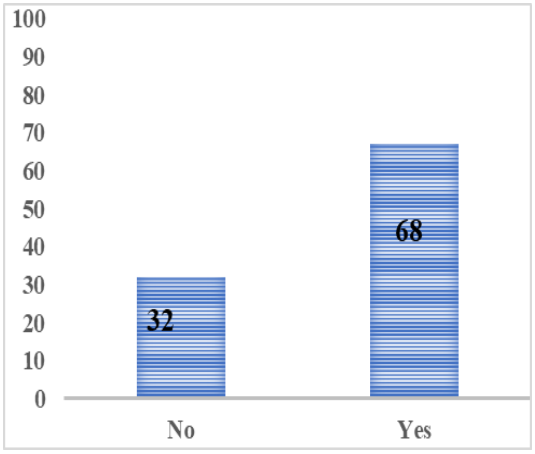

Figure1: Percentage of prophylactic anticoagulants application among the totally studied high-risk patients

Orthopedic Patients

In the Orthopedic department, about 60.6% of the high-risk patients were given prophylactic anticoagulants, where 66.6% of the patients were male and 18.2% of them were younger than 40 years.

Table 1: Distribution of the high-risk patients in the Orthopedic department according to Age & gender.

Age(years)/Gender	No.	Percent (%)
>40	27	81.8
<40	6	18.2
Male	22	66.6
Female	11	33.4

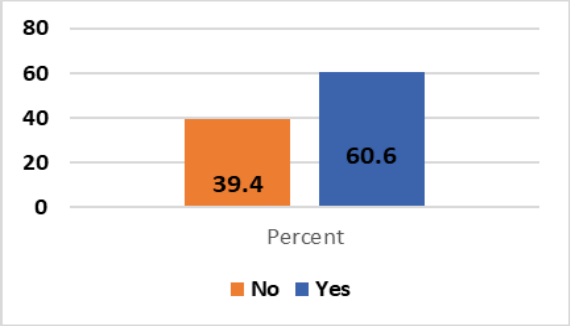

Figure 2: Distribution of the high-risk patients in the Orthopedic department according to the percentage of application of prophylactic anticoagulants

Gynecological/ Obstetric Patients

In the Gynecological department, about 72.7% of the high-risk patients were given prophylactic anticoagulants. Of all patients in this department, 51.5% were younger than 40 years and only 6.1% had other risk factors for VTE (one patient with a history of previous DVT and another patient with a history of previous stroke).

Table 2: Distribution of the high-risk patients in the Gynecological/ Obstetric department according to age

Age	NO	Percent
>40	16	48.5
<40	17	51.5

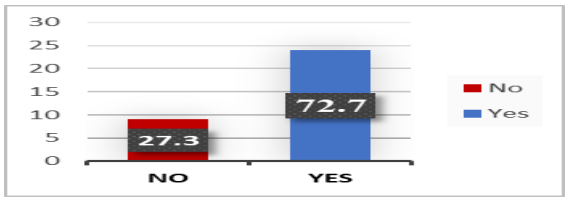

Figure 3: Distribution of the high-risk patients in the Gynecological/ Obstetric department according to the percentage of application of prophylactic anticoagulants

Neurosurgical Patients

In the Neurosurgical department, 69.7% of the high-risk patients were given prophylactic anticoagulants for VTE, where 72.7% of them were male and 42.4% were younger than 40 years.

Table 3: Distribution of the high-risk patients in the Neurosurgical department according to age and gender

Age/Gender	NO	Percent
>40	19	57.6
<40	14	42.4
Male	24	72.7
Female	9	27.3

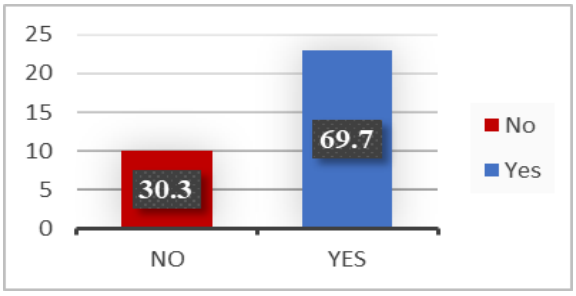

Figure 4: Distribution of the high-risk patients in the Neurosurgical department according to the percentage of application of prophylactic anticoagulants.

Discussion

This study aimed to identify the percentage of prophylactic anticoagulant application in high-risk surgical patients admitted to the Neurosurgical, Gynecological and Orthopedic surgical departments at Al-Thawra Hospital, during the period from 1/1/2014 to 31/12/2014.

A remarkable finding of this study is that out of the 99 studied high-risk surgical patients, 67 patients (68 %) were given prophylactic anticoagulants. This percentage is low compared with the findings of the ENDORSE global study, in which the percentages of high-risk surgical patients who received prophylactic anticoagulant for VTE in the developed countries were 92% in Germany, 87% in Hungary, 82% in Spain, and 81% in Switzerland [9,10].

However, a retrospective study in King Fahd General Hospital disclosed that 44.1% of the high-risk surgical patients received prophylactic antithrombotic therapy [8].

The current study outcomes showed that the percentages of high-risk surgical patients who were given prophylactic anticoagulants for VTE at AL-Thawra Hospital, Sana'a, during the period from 1/1/2014 to 31/12/2014, in the Orthopedic, Gynecological and Neurosurgical department were 60.6%, 72.7% and 69.7%, respectively. The prevalence of VTE was even higher in orthopedic patients, more than 50% of major orthopedic procedures are complicated by DVT and up to 30% by PE when VTE prophylaxis is not instituted. Despite that higher prevalence, the application of prophylactic anticoagulants was slightly lower comparing to the Gynecological and Neurosurgical departments. In the orthopedic department, 66.6% of the patients were male gender and 18.2% of them were younger than 40 years. In the Neurosurgical department, 72.7% of the patients were male and 42.4% of them were younger than 40 years. In the Gynecological department, 51.5% of the patients were younger than 40 years.

Conclusion

Based on the present study findings, it can be concluded that there is underutilization of prophylactic anticoagulant application as compared to the higher percentage of application globally, according to the ENDORSE study results. It was also found that there is no significant difference in the percentage of prophylactic anticoagulant application among the patients of the Orthopedic, Neurosurgical and gynecological surgical departments. There is a gap between guidelines and practice, physicians may not be aware of or may not consistently use up-to-date evidence-based prevention guidelines. However, this study had some potential limitations which should be considered while interpreting the results. The data were collected only during short visits to the hospital. Since there were no follow-up visits, the outcomes and the pattern of anticoagulant prophylaxis were not evaluated according to the recommendations of the ACCP guidelines.

Finally, it is recommend to improve physicians' knowledge, attitudes, and practices in relation to the assessment of the risk factors leading to the development of VTE in surgical patients and use up-to-date evidence-based guidelines about the prophylaxis

strategies for VTE. Continuing medical education (CME) on VTE is also important and can make a change in physicians' behavior.

References

1. Longo, Dan; Fauci, Anthony; Kasper, Dennis; Hauser, Stephen; Jameson, J.; and Loscalzo, Joseph. Harrisons Manual of Medicine, 18th Edition. US: McGraw-Hill Professional, 2012.Current 2014 chpter 14 Prevention of Venous Thromboembolic Disease.
2. McPhee, S. J., Papadakis, M. A., & Rabow, M. W. (2014). Current medical diagnosis & treatment 2014. 53rd ed. New York, McGraw-Hill Medical.Series Editor: Kamal M.F. Itani, MD (Primary Prophylaxis of Venous Thromboembolism in Surgical Patients).
3. Bergmann JF, Cohen AT, Tapson VF, Goldhaber SZ, Kakkar AK, Deslandes B, Huang W, Anderson FA Jr; ENDORSE Investigators. Venous thromboembolism risk and prophylaxis in hospitalised medically ill patients. The ENDORSE Global Survey. Thromb Haemost. 2010 Apr;103(4):736-48. doi: 10.1160/TH09-09-0667. Epub 2010 Feb 2. PMID: 20135072. (ENDORSE), a multinational cross-sectional study: Results from the Indian subset data.
4. Geerts WH. Prevention of venous thromboembolism in high-risk patients. Hematology Am Soc Hematol Educ Program 2006:462–6 jurnal of the American colleague of chest physicians.
5. Francis CW. Clinical practice. Prophylaxis for thromboembolism in hospitalizedmedical patients. N Engl J Med. 2007 ;356 (14) : 1438-1444.
6. Geerts WH. Prevention of venous thromboembolism in high-risk patients. Hematology Am Soc Hematol Educ Program 2006:462–6 jurnal of the American colleague of chest physicians.
7. Francis CW. Clinical practice. Prophylaxis for thromboembolism in hospitalizedmedical patients. N Engl J Med. 2007 ;356 (14) : 1438-1444.
8. Essam AE, Sharif G, Al-Hameed F. Venous thromboembolism-related mortality and morbidity in King Fahd General Hospital, Jeddah, Kingdom of Saudi Arabia. Ann Thorac Med [serial online] 2011 [cited 2014 May 4];6:193-8.
Availablefrom: http://www.thoracicmedicine.org/text.asp?2011/6/4/193/84772
9. Dennis R15. J, Roa JH, Villadiego J, Méndez F, Vieda E, Restrepo H. Venous thromboembolism prophylaxis in Colombian surgical and medical patients: results for Colombia of the ENDORSE study. Biomedica 2011; 31 : 200-8.
10. Cohen AT, Davidson BL, Gallus AS,et al; ARTEMIS investigators. Efficacy and safety of fondaparinux for the prevention of venous thromboembolism in older acute medical patients: Randomised placebo controlled trial. BMJ. 2006;332(7537):325-329.
11. Leizorovicz A, Cohen AT, Turpie AG, et al; PREVENT Medical Thromboprophylaxis Study Group. Randomized, placebocontrolled trial of dalteparin for the prevention of venous

thromboembolism in acutely ill medical patients. Circulation. 2004;110(7):874-879.

12. Samama MM, Cohen AT, Darmonn JY, et al. A comparison of enoxaparin with placebo for the prevention of venous thromboembolism in acutely ill medical patients. Prophylaxis in Medical Patients with Enoxaparin Study Group. N Engl J Med. 1999;341(11):793-800.

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Original Research Article

The Pattern and Distribution of Risk Factors of Stroke among Yemeni Patients at USTH and Al-Gumhori Teaching Hospital in Sana'a City, Yemen

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Abstract

Background: Strokes are a heterogeneous group of disorders involving sudden and focal interruption of cerebral blood flow that causes neurologic deficit.

Aim: This study aimed to assess the distribution of risk factors of stroke among Yemeni patients diagnosed at University of Science & Technology Hospital (USTH) & AL-Gumhuri Hospital in Sana'a City, Yemen.

Methodology: This study was descriptive cross-sectional. It include161 stroke patients in Al-Gumhori Hospital and USTH, Sana'a, April, 2022. The sample was selected by a simple randomized method. Demographic data included personal data, age, gender, social habits (such as chewing Qat), smoking, medical history, the type of stroke…etc. Data were collected from the participants through interviews of close and open-ended questionnaires. The statistical program (SPSS version 23) was used in data analysis, including frequencies, percentages, arithmetic mean, standard deviation and p-value.

Results: The total number of participants in this study was 161. The findings showed that the stroke type of about three fourths of the participants (73.3%) was Ischemic, 19.9% were of Hemorrhage, and only 2.5% were of TIA. The findings also showed that about two thirds of perticipants (64.6%) were male and about half of them (47.2%) were between the age of 45 to 64 years. The average of age was 59.08, of which 65.8% have HTN, 37.9% of the patients reported to have Diabetes Miletus, the average of Triglyceride was 128.01(56.97) where 17.4% of them have Triglyceride greater than 150. HDL cholesterol average was (36.21(13.30), LDL cholesterol average was 102.0(33.6), HTN,

as stroke risk factor, gets more prevalent as patients get older and older ($p<0.05$). DM is more associated with ages above 45 years ($p<0.05$). The findings revealed that while hypertension and DM are two significant risk factors of Hemorrhagic stroke type, hypertension is significantly associated with risk factors of Ischemic stroke type ($p<0.05$).

Conclusion: Prevalence of stroke in males was almost twice high than in females. The age-specific prevalence showed a gradual rising trend with increasing age. The most common risk factors observed among stroke patients are Hypertension, then dyslipidemia, tobacco use, diabetes, and ischemic heart disease, respectively.

Key words*:* Risk Factors, Stroke, Stroke Patients

Introduction

Strokes are a heterogeneous group of disorders involving sudden and focal interruption of cerebral blood flow that causes neurologic deficit [1]

Epidemiology: Globally, ischemia accounts for 62 percent, intracerebral hemorrhage 28 percent, and subarachnoid hemorrhage 10 percent of all incident strokes, reflecting a higher incidence of hemorrhagic stroke in low- and middle-income countries [2,3]. In the United States, the proportion of all strokes due to ischemia, intracerebral hemorrhage, and subarachnoid hemorrhage is 87, 10, and 3 percent, respectively [4].

The lifetime risk of stroke for adult men and women (25 years of age and older) is approximately 25 percent [5]. The highest risk of stroke is found in East Asia, Central Europe, and Eastern Europe. Worldwide, stroke is the second most common cause of mortality and the second most common cause of disability [6].

The annual incidence of new or recurrent stroke in the United States is about 795,000, of which about 610,000 are first-ever strokes and 185,000 are recurrent strokes[4].

Statistics on Stroke Incidence and Mortality

Globally, stroke remains the second-leading cause of death and the third-leading cause of death and disability combined (as expressed by disability-adjusted life-years lost - DALYs) in the world [7].

In the Middle East (ME) region, people suffer from high rates of no communicable diseases where the prevalence of hypertension is unacceptably high among adults aged 25 years and older, reaching 30% of this population, and diabetes rates attaining 11% of the population [8] Moreover, the highly prevalent risk factors pattern is similar among the majority of the ME countries as well as the low rate of self-awareness and control of no communicable diseases [9,10] Additionally, the ME lacks knowledge for cerebrovascular risk factors, awareness, causes, and symptoms as seen in many studies [11,12], which is a concern, especially in increasing the chances of patients of benefiting from acute intervention including

thrombectomy [13,14], thrombolysis, [15,16] and stroke unit treatment[9].

As for the Republic of Yemen, according to the latest WHO data published in 2020, stroke deaths in Yemen reached 13,570 cases, (8.72%) of total deaths. The adjusted death rate is 127.49 per 100,000 of population, ranking Yemen 32 in the world [17].

Risk Factors

Hypertension is the most predominant risk factor in all stroke types, present in 24.9 – 80% of patients [18,19], followed by diabetes, 5.1– 69.4% [20,21]. Dyslipidemia is reported by 5.4–65.8% [22,23], and smoking by 1.6–47.34% [24,21]. Other risk factors include previous ischemic transient attack (2.1–39%) [18,25]; cardiac diseases (4–50%) [26,27]; obesity (5.3–66%) [24,28]; family history of stroke (5.4–31.6%) [29,30]. No risk factors were reported by 7.9–27.5% of cases [18,22] in the ME.

The mean age of stroke patients in Yemen was 59.6 years, with a 62.6% male-to-female predo aged above 45years. The most common stroke pattern was ischemic in 72%, hemorrhagic in 25 % and was undetermined in 2.5%. The most common age for stroke was the middle age group (15-44 years) as the stroke was seen in 51.7% of them.

The major associated medical conditions were hypertension (HTN) in (68.3%), cardiac diseases that account for (42.4%) and diabetes mellitus (DM) in (24.4%). Hypertension was more common in the hemorrhagic stroke (82.6%) versus 61.6% in the ischemic group. Assessing the known risk factors, smoking history was positive in 42% and hyperlipidemia in (13.9%). QAT chewing habit was positive in (43.4%) of the patients. QAT chewing is known to be associated with hypertension. The fatality rate was (24.2%), and it was higher in hemorrhagic stroke (28.8%), than in ischemic stroke, (19.7%) [31].

Causes and Risk Factors of Stroke

Hypertension, smoking, dyslipidemia, diabetes insulin resistance, abdominal obesity, Excess alcohol consumption, lack of physical activity, high-risk diet (e.g., high in saturated fats, trans fats, and calories), psychosocial stress (e.g., depression), heart disorders (particularly disorders that predispose to emboli, such as acute MI, infective endocarditis, and atrial fibrillation), hypercoagulability (thrombotic stroke only), intracranial aneurysms (subarachnoid hemorrhage only), use of certain drugs (e.g., cocaine, amphetamines), and vasculitis are modifiable factors that contribute to increased risk of stroke [32].

On the other hand, unmodifiable risk factors include prior stroke, older age, family history of stroke, and genetic factors

Classification of Stroke

Stroke is divided in to two major types: brain ischemia (due to thrombosis, embolism, or systemic hypo perfusion) and brain hemorrhage (due to intracerebral hemorrhage (ICH) or subarachnoid hemorrhage (SAH)) [33]. Moreover, stroke is divided into four subtypes: intracerebral hemorrhage, subarachnoid hemorrhage, ischemic (thrombotic), and ischemic (embolic) [34].

Evaluation of Stroke

Evaluation of stoke aims to establish knowledge for the following aspects of inquiry: whether stroke has occurred, whether stroke is ischemic or hemorrhagic, whether

emergency treatment is required, what are the best strategies for preventing subsequent strokes, and whether and how to pursue rehabilitation. Stroke is suspected in patients with any of the following: sudden neurologic deficits compatible with brain damage in an arterial territory, a particularly sudden severe headache, sudden and unexplained coma, sudden impairment of consciousness, also by brain CT scan, and MRI [35].

Treatment of Stroke

- Stabilization
- Reperfusion for some ischemic strokes
- Supportive measures and treatment of complications
- Strategies to prevent future strokes [36]

Rationale of the Study

1. There are few studies about this subject in Yemen.
2. Multiple risk factors related to stroke in Yemen such as: Qat chewing, smoking.
3. Stroke in general is major health problems worldwide.
4. Increased number of stroke cases in Yemen.
5. Stroke is the second most common cause of mortality and the second most common cause of disability [36].

Research Question

What are the risk factors of stroke among Yemeni patients at USTH and Al-Gumhori Teaching Hospital in Sana'a City, Yemen?

Significance of the Study

This study is significant to identify and estimate the distribution of risk factors of stroke among patients.

Limitations of the Study

1. Most of the cases were discharged of the hospital without making echo. Moreover, the patients who did it, they mostly had normal echo or had signs of IHD, HHD or VHD.
2. All of Al-Gumhori hospital cases didn't do Doppler US, and most of USTH cases who did it, they had normal Doppler US; except few cases who had less than 60 % stenosis and one case had small atheroma.
3. All cases were taken from medical ward, so a few TIA cases were found.

Objectives of the Study

General Objective

This study aimed to estimate the distribution of risk factors of stroke among Yemeni patients at USTH and Al-Gumhori Teaching Hospital.

Specific Objectives

1. To identify the types risk factors of stroke among patients diagnosed.
2. To determine the distribution of risk factors in patients regarding to gender, habits behavior and any medical disease as HTN, DM …. etc.

Study Hypothesis

There are multiple risk factors of stroke in Yemeni patients that lead to occurrence of stroke.

Methodology

This study is a cross sectional descriptive study which include161 stroke patients in private and public hospitals in Sana'a (USTH and Al-Gumhori Teaching Hospital). It was carried out within six months. Data were

collected by using an interview and a questionnaire about risk factors. The questionnaire contained open-ended and close-ended questions. The study variables involved patient's personal data, age, gender, occupation, address, habits (such as chewing Qat, smoking, consuming alcohol, nutritional habits), medical history, hereditary predisposing, and type of stroke.

Inclusion and Exclusion Criteria

Inclusion criteria: 161 patients (males & females); (age group >15 years old); (those who already diagnosed with stroke in patient).

Exclusion criteria: (patients who do not have stroke); (stroke cases below age of 15 years).

Analysis of Data: Data were analyzed by SPSS version 23, including frequencies, percentages, arithmetic mean, standard deviation, and *p*-value.

Ethical Consideration:

Ethical approval was obtained from the hospitals from which the study data were collected. Patients were included after obtaining informed verbal consents from them. They were informed of the study objectives and were also confirmed that the methods of data collection would not cause any physical or psychological harm to them. They were also confirmed that all collected data would be handled confidentially and would be used solely for the purpose of the study.

Results

Demographic Characteristics

Table (1) Demographic Characteristics

		N	%	Mean (SD)
Gender	Male	104	64.6%	
	Female	57	35.4%	
Age	20-45	28	17.4%	59.08 ±14.32
	45-64	76	47.2%	
	65-100	57	35.4%	
Chewing Khat	No	56	34.8%	
	Yes	105	65.2%	
Smoking	No	111	68.9%	
	Yes	50	31.1%	
Ex-Smoker	Yes	46	28.6%	

Table (1) shows that out of 161 patients, about two thirds (64.6%) of them are male and about half of them (47.2%) are at the age group (45-64 years), by which the average age is 59.08 with SD of ± 14.32. It also shows that out of 161 patients, 65.2%% are Qat chewers, 31.1% are smokers, and 28.6% are ex-smokers.

History

Table (2): Type, Duration Neurological Deficit, and History of Stroke

		No.	%
Type of Stroke	Ischemic	118	73.3%
	Hemorrhage	32	19.9%
	Tia	4[total 154]*	2.5%
Duration of the stroke	1-9 days	135	83.9%
	10-19 days	22	13.7%
	>20 days	4	2.5%
Neurological Deficit	Hemiplegia	122	87.1%
	sensory loss	1	0.7%
	Aphasia	42	30.0%
	Dysarthria	64	45.7%
	facial deviation	15	10.7%
	Ataxia	3	2.1%
History		41	25.5%
Times	One time	31	75.6%
	2 times or more	10	24.4%
Type of stroke in	Ischemic*	29	70.7%
	Hemorrhagic	4	9.8%
CKD		4	2.5%
CLD		10	6.2%
Bleeding disorder		1	0.6%
IHD		31	19.3%
Valvular HD		14	8.7%
Anticoagulant		12	7.5%
antiplatelet		69	42.9%
Family History(n=94)	CVA (N=13)	13	23.6%
	hemorrhagic (N=13)	7	53.8%
	Ischemic(N=13)	6	46.2%
	HTN	40	72.7%
	DM	33	60.0%

The results in Table (2) shows that the stroke types were Ischemic in 73.3%, Hemorrhage in 19.9%, and Tia in only 2.5% of the patients involved in this study. The results also show that 83.9% of these strokes lasted for a duration between1-9 days. Hemiplegia was found in 87.1%, dysarthria in 45.7%, and aphasia in 30% of the patients, while facial deviation was detected in 10.7% of those having neurological deficits associated with stroke. In addition, only 25.5% of the patients have a history of stroke of which 75.6% have it for one time and 24.4% for two times or more; from which 70.7% of these strokes were Ischemic in type, 9.8% were Hemorrhagic, and 20.5%

were not identified. Moreover, the results reveal that 2.5% of the cases have CKD, 6.2% have CLD, 0.6% have bleeding disorder, 19.3% have IHD, and 8.7% have Valvular HD; from which 7.5% patients take anticoagulant and 42.9% take antiplatelet (Aspirin). Finally, it can be observed that out of 94 patients having first degree family history, 23.6% have a history of CVA of which 53.8% are hemorrhagic and 46.2% are ischemic stroke, 72.7% have family history of HTN, and 60% have DM.

Descriptive Statistics of Stroke Risk Factors

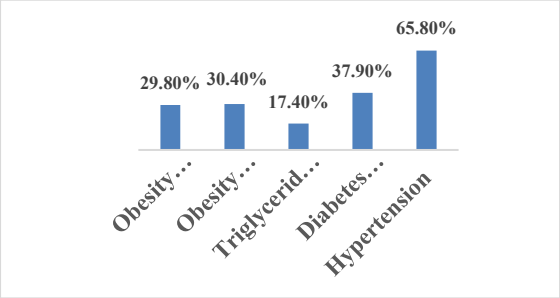

Figure (1) Descriptive Statistics of Stroke Risk Factors*

Figure (1) displays the statistics of Hypertension, in which out of 161 patients (65.8%) have HTN**.**

Hypertension

Table (3) Stroke Risk Factors

	No.	%	Mean (SD)
Hypertension	106	65.80%	
HTN duration			6.29(5.44)
BP>130/85	52	49.06%	
Anti HTN medications	39	36.79%	
HTN medication duration			7.06(6.45)
COMPLAINT	25	15.50%	
CONTTOLED	24	14.90%	
ACE inhibitors	55	34.20%	
B-BLOKERS	26	16.10%	
CCB	21	13.00%	

Table (3) displays the statistics of Hypertension. It can be seen that out of 161 patients, 65.8% have HTN with an average duration of (6.29) years. It can also be seen that out of 106 patients with HTN, 49.06% have blood pressure greater than (130/85) and 36.79% of them take anti HTN medications with an average duration of (7.06) years. The findings also show that 15.50% of the cases are compliant, 14.90% are controlled, 34.20% are ACE inhibitor, 16.10% are B-blockers, and 13% are CCB.

Diabetes Miletus

Table (4) The statistics of Diabetes Miletus

		N	%	Mean (SD)
Diabetes Miletus		61	37.90%	
Type of DM	Type I	1	1.70%	
	Type II	60	98.30%	
Duration				6.28(5.36)
FBS				160.69(103.86)
>=100		53	86.80%	
Hyperglycemia Medications		57	93.4%	
Oral		42	73.7%	
Insulin		15	26.3%	
HbA1c				8.63(2.14)

Table (4) presents the statistics of Diabetes Miletus. It can be noticed that out of 161 patients with stroke, 37.9% of them reported to have Diabetes Miletus, in which out of 44 patients, majority of them 97.7% have Type II DM. The FBS average is 160.69(±103.86). In addition, it can be seen that out of 61 DM patients, 86.80% of them have FBS >=100 and 93.4% take hyperglycemia medications- of which 73.7% take oral and 26.3% takes insulin. The average of HBA is 8.63(±2.14).

Dyslipidemia

Table (5) The statistics of Triglyceride

		Mean (SD)	N	%
Triglyceride		128.01(56.97)		
Triglyceride >150			28	17.4%
HDL cholesterol		36.21(13.30)		
male <40 N=104)			63	60.6%
female <50 (N=57)			41	71.9%
LDL			36	23.1%
LDL>130	102.0(33.6)		30	18.6%
Medications				

Table (5) shows the statistics of Triglyceride. The results show that the average of Triglyceride is 128.01(56.97) where 17.4% of the patients have Triglyceride greater than 150. LDL cholesterol average is 102.0(33.6) where 23.1% of the patients have LDL greater than 130. HDL cholesterol average is (36.21(13.30). The results also reveal that out of 104 male patients, 60.6% have HDL less than 40 mg, and out of 57 female patients, 71.0% have HDL less than 50. Only 18.6% of the patients take medications.

Obesity

Table (6): Obesity

	Mean (SD)	N	%
Waist circumference	92.55(14.76)		
Male>90		49	30.4%
Female >80		48	29.8%

According to the results in Table (6), the waist circumference average is 92.55(±14.76), in which 30.4% of the male patients have waist circumference >90 cm and 29.8% of female patients have waist circumference >80 cm.

Distribution of Risk Factors According to Gender

Exact Fisher test was run to examine any significant association between Gender and stroke risk factors. As shown in Table (7), there is no statistically significant association between chewing Qat, smoking, HTN, DM and dyslipidemia, as risk factors for stroke, and gender ($p>0.05$). However, ex-smoking was found to be risk factor for male more than female ($p<0.05$) while obesity was found to be risk factor prevalent among female more than male ($P<0.05$).

Table (7) Distribution of risk factors according to Gender

		Gender				X^2	*P*
		Male		Female			
		N	%	N	%		
Chewing Khat	No	31	55.4%	25	44.6%	3.205	.073
	Yes	73	69.5%	32	30.5%		
Smoking	No	69	62.2%	42	37.8%	.926	.336
	Yes	35	70.0%	15	30.0%		
Ex-Smoker	No	67	58.3%	48	41.7%	7.064	.008
	Yes	37	80.4%	9	19.6%		
Hypertension	No	36	65.5%	19	34.5%	.027	.870
	Yes	68	64.2%	38	35.8%		
Obesity	No	55	85.9%	9	14.1%	21.155	.000*
	Yes	49	50.5%	48	49.5%		
Diabetes Miletus	No	64	64.0%	36	36.0%	.041	.839
	Yes	40	65.6%	21	34.4%		
Triglyceride >150	No	88	66.7%	44	33.3%	1.374	.241
	Yes	16	55.2%	13	44.8%		
LDL>150	No	72	64.9%	39	35.1%	.162	.687
	Yes	24	68.6%	11	31.4%		

Distribution of Risk Factors According to Age Group

Exact Fisher test was run to examine any significant association between Age groups and stroke risk factors. As demonstrated in Table (8), chewing Qat was not associated with age groups as a risk factor of stroke, ($p>0.05$). On the other hand, smoking and ex-smoking were prevalent risk factors among younger age groups ($p<0.05$). In addition, HTN got more prevalent as stroke risk factor as patients get older in age ($p<0.05$). Moreover, DM and dyslipidemia were more associated with ages above 45 years ($p<0.05$).

Table (8) Distribution of risk factors according to age group

		Age groups 20-45		45-64		65-100		P
		n	%	n	%	n	%	
Chewing Khat	No	7	25.0%	25	32.9%	24	42.1%	.266
	Yes	21	75.0%	51	67.1%	33	57.9%	
Smoking	No	13	46.4%	48	63.2%	50	87.7%	.000*
	Yes	15	53.6%	28	36.8%	7	12.3%	
Ex-Smoker	No	27	96.4%	57	75.0%	31	54.4%	.000*
	Yes	1	3.6%	19	25.0%	26	45.6%	
Hypertension	No	16	57.1%	25	32.9%	14	24.6%	.011*
	Yes	12	42.9%	51	67.1%	43	75.4%	
Glyceride >150	No	24	85.7%	61	80.3%	47	82.5%	.809
	Yes	4	14.3%	15	19.7%	10	17.5%	
Diabetes Miletus	No	27	96.4%	39	51.3%	34	59.6%	.000
	Yes	1	3.6%	37	48.7%	23	40.4%	
Obesity	No	12	42.9%	26	34.2%	26	45.6%	.386
	Yes	16	57.1%	50	65.8%	31	54.4%	
LDL>130	No	21	18.9%	54	48.6%	36	32.4%	.417
	Yes	4	11.4%	16	45.7%	15	42.9%	

Distribution of Risk Factors According to Type of Stroke

Table (9) Distribution of risk factors according to type of stroke

Risk factor	Type of stoke						*P*
	Ischemic		Hemorrhage		Tia		
	N	%	N	%	N	%	
Chewing Khat	78	78.80%	19	19.20%	2	2.00%	.786[a]
Smoking	36	75.00%	11	22.90%	1	2.10%	.726[a]
Ex-Smoker	34	79.10%	8	18.60%	1	2.30%	.974[a]
Hypertension	75	74.30%	23	22.80%	3	3.00%	.279[a]
>150	21	75.00%	7	25.00%	0	0.00%	.465[a]
Obesity	72	80.90%	14	15.70%	3	3.40%	.348[a]
Diabetes Miletus	49	83.10%	8	13.60%	2	3.40%	.335[a]
LDL	24	68.6%	10	28.6%	1	2.9%	.329

Fisher test was also run to examine the cross tabulation between risk factors of stroke and type of stroke. As given in Table (9), there was no statistically significant association between the stroke risk factors (chewing Qat; smoking; ex-smoking; HTN; dyslipidemia; obesity; DM) and the type of stroke (P>0.05). However, these risk factors were found to be three-fold among ischemic strokes in comparison with other types. In other words, out of five patients having stroke, four of them can be ischemic and one can be hemorrhagic. TIA type is very rare strokes.

Logistic Regression Findings of Risk Factors of Hemorrhagic and Ischemic Strokes

Table (10) Logistic Regression of Risk Factors of Hemorrhagic and Ischemic Stroke

	B	S.E.	Wald	p	Exp(B)	95% C.I.for EXP(B)	
						Lower	Upper
Risk factors of Hemorrhagic stroke							
HTN	.974	.480	4.124	.042	2.650	1.035	6.786
DM	.954	.460	4.291	.038	2.595	1.053	6.398
Obesity	-.028-	.413	.005	.946	.972	.433	2.183
Risk factors of ischemic stroke							
HTN	.909	.431	4.443	.035	2.482	1.066	5.781
DM	-.104-	.381	.075	.785	.901	.428	1.900
Obesity	.289	.376	.592	.442	1.336	.639	2.791
Constant	.696	.324	4.621	.032	2.005		

The findings in Table (10) show that hypertension and DM were two significant risk factors of Hemorrhagic stroke type (p<0.05) HTN: (OR=2.650; CI: 1.035-

6.78); DM:(OR=2.595; CI: 1.053-6.398) while other risk factors, such as obesity, were not found to be associated with ischemic stroke type (P>0.05). The findings also show that hypertension significantly associated with risk factors of Ischemic stroke type (p<0.05, OR=2.482; CI: 1.066-5.781) while other risk factors, such as DM and obesity, were not found to be associated with ischemic stroke type(p>0.05).

Discussion

Even though risk factors of stroke have been clearly identified in many populations worldwide, which help guiding appropriate prevention and control strategies [37,38], Yemen should determine the impacts of various risk factors on stroke among populations to adapt prevention and control policies that are relevant to the national context especially when resources are limited. Like other studies in Asia, Middle East and North Africa [39,40], hypertension was a major modifiable risk factor of stroke. The prevalence of hypertension among stroke patients was about 3-fold higher than general population. Furthermore, in this case-cohort comparison, hypertension also played a major role in stroke. Approximately 65.80% of stroke in population was related to hypertension, which was even more prominent in middle-aged group of 45-64 years**,** 67.1%. In Yemen, the estimated prevalence of hypertension for the age group between 30 and 64 is 17.1% and the crude prevalence was 13.5%.[41].

Hypertension prevention and control programs should be seriously promoted, particularly in the middle-aged group. In this study, maleness and increasing age were important non-modifiable risk factors. Stroke primary prevention should be emphasized and directed to appropriate target populations.

While there was no statistically significant association between smoking and the disease in the overall model, opposite finding was observed in the age group-specific model. Among those aged 20-45 years, smoking carried the highest PAF of stroke, 53.6%. If the concerned authorities in Yemen could implement successful smoking prevention and cessation interventions in young people, annual incidence of stroke in the young generation would be significantly reduced. This study also showed a significant association between diabetes mellitus and stroke. A similar finding was documented in South-East Asia and Western Pacific regions of WHO. [42]. However, in age group-specific multivariable model, PAFs were less than 10% for diabetes mellitus in all groups. Effects of diabetic control could reduce risk of stroke in all age groups. Several risk factors, such as dyslipidemia, DM, and obesity, were not recorded in NHIS properly, so the prevalence and impact of these factors could not be evaluated.

Conclusions

The findings of this study demonstrated the prevalence of stroke common risk factors among the stroke patients. Further, the prevalence of stroke in males was almost twice than in females. The age-specific prevalence showed a gradual rising trend with increasing age. The most common risk factors observed among stroke patients involved in this study were hypertension, dyslipidemia, smoking, diabetes, ischemic,

and heart disease. It is recommended that hypertension control program should be a priority in middle and old age groups.

References

1. alaudeen MA, Bello N, Danraka RN, Ammani ML. Understanding the Pathophysiology of Ischemic Stroke: The Basis of Current Therapies and Opportunity for New Ones. Biomolecules. 2024; 14(3):305. https://doi.org/10.3390/biom140303
2. Krishnamurthi RV, Feigin VL, Forouzanfar MH, et al. Global and regional burden of first-ever ischaemic and haemorrhagic stroke during 1990- 2010: findings from the Global Burden of Disease Study 2010. Lancet Glob Health 2013; 1:e259.
3. GBD 2019 Stroke Collaborators. Global, regional, and national burden of stroke and its risk factors, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet Neurol 2021; 20:795.
4. Virani SS, Alonso A, Benjamin EJ, et al. Heart Disease and Stroke Statistics2020 Update: A Report From the American Heart Association. Circulation 2020; 141:e139.
5. GBD 2016 Lifetime Risk of Stroke Collaborators, Feigin VL, Nguyen G, et al. Global, Regional, and Country-Specific Lifetime Risks of Stroke, 1990 and 2016. N Engl J Med 2018; 379:2429.
6. GBD 2016 Neurology Collaborators. Global, regional, and national burden of neurological disorders, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Neurol 2019; 18:459.
7. 7.Stroke in Yemen, https://www.worldlifeexpectancy.com/yemen-stroke, World Life Expectancy. August 10, 2024
8. WSO Global Stroke Fact Sheet 2022,https://www.world-stroke.org/news-and-blog/news/wso-global-stroke-fact-sheet-2022, World Stroke Organization, August 10, 2024
9. World Health Organization. World health statistics 2012. WHO, 2012. Available at http://apps.who.int/iris/bitstream/10665/44844/1/9789241564441_eng.pdf (accessed 25 May 2015).
10. Esteghamati A, Abbasi M, Alikhani S, et al. Prevalence, awareness, treatment, and risk factors associated with hypertension in the Iranian population: the national survey of risk factors for noncommunicable diseases of Iran. Am J Hypertens 2008; 21: 620–626. [PubMed] [Google Scholar]
11. Al-Nozha MM, Al-Maatouq MA, Al-Mazrou YY, et al. Diabetes mellitus in Saudi Arabia. 2004, http://dspace.nu.edu.sa/jspui/handle/123456789/2272 (accessed 28 May 2015).
12. Eshah NF. Knowledge of stroke and cerebrovascular risk factors among

Jordanian adults. J Neurosci Nurs 2013; 45: E13–E19. [PubMed] [Google Scholar]

13. Al shafaee MA, Ganguly SS, Al asmi AR. Perception of stroke and knowledge of potential risk factors among Omani patients at increased risk for stroke. BMC Neurol 2006; 6: 38. [PMC free article] [PubMed] [Google Scholar]
14. Saver JL, Goyal M, Bonafe A, et al. Stent-retriever thrombectomy after intravenous t-PA vs. t-PA alone in stroke. N Engl J Med 2015; 372: 2285–2295. [PubMed] [Google Scholar]
15. Berkhemer OA, Fransen PS, Beumer D, et al. A randomized trial of intraarterial treatment for acute ischemic stroke. N Engl J Med 2015; 372: 11–20. [PubMed] [Google Scholar]
16. Kermode-Scott B. Research suggests thrombolysis is effective for acute ischaemic stroke. Br Med J 2005; 330: 1167. [Google Scholar]
17. Hill MD, Buchan AM, Investigators CA for SES (CASES), others Thrombolysis for acute ischemic stroke: results of the Canadian Alteplase for Stroke Effectiveness Study. Can Med Assoc J 2005; 172: 1307–1312. [PMC free article] [PubMed] [Google Scholar]
18. El-sayed MM, Adeuja AO, El-nahrawy E, et al. Characteristics of stroke in Hofuf, Saudi Arabia. Ann Saudi Med 1999; 19: 27–31. [PubMed] [Google Scholar]
19. Qutub HO. Ischemic strokes requiring mechanical ventilation in the Intensive Care Unit.Neurosciences 2001; 6: 103–105. [PubMed] [Google Scholar]
20. Parniya R, Savadi-Oskuei D, Mousavi S. Mortality rate in patients with intracranial hemorrhage and its risk factors at Alavi Hospital, Ardabil. J Ard Uni Med Sci 2006; 6: 363–367. [Google Scholar]
21. Al-Shammri S, Shahid Z, Ghali A, et al. Risk factors, subtypes and outcome of ischaemic stroke in Kuwait—a hospital-based study. Med Princ Pract 2003; 12: 218–223. [PubMed] [Google Scholar]
22. Ayoola AE, Banzal SS, Elamin AK, et al. Profile of stroke in Gizan, Kingdom of Saudi Arabia. Neurosciences 2003; 8: 229–232. [PubMed] [Google Scholar]
23. Mirghani Z, Zein T. Total and LDL cholesterol as risk factors of ischemic stroke in Emirati patients. The Internet Journal of Neurology 2009; 13: 1, . [Google Scholar]
24. Al-Heeti W. The risk factors for cerebro-vascular accident (CVA)(stroke) and major life events in patients admitted to Saddam General Hospital in Ramadi, Iraq. Neurosciences 2003; 8: 58–58. [Google Scholar]
25. Al-Rajeh S. Stroke in the elderly aged 75 years and above. Cerebrovasc Dis 1994; 4: 402–406. [Google Scholar]

26. Al-Jishi A, Mohan P. Profile of stroke in Bahrain. Neurosciences 2000; 5: 30–34. [PubMed] [Google Scholar]
27. Balci K, Utku U, Asil T, et al. Ischemic stroke in young adults: risk factors, subtypes, and prognosis. Neurologist 2011; 17: 16–20. [PubMed] [Google Scholar]
28. Akhtar N, Kamran SI, Deleu D, et al. Ischaemic posterior circulation stroke in State of Qatar. Eur J Neurol 2009; 16: 1004–1009. [PubMed] [Google Scholar]
29. Al-Asadi JN, Habib HA. Risk factors and 30-day case fatality of first-ever stroke in Basrah, Iraq. Niger Med J 2014; 55: 209. [PMC free article] [PubMed] [Google Scholar]
30. Sallam A-R, Al-Aghbari K and Awn H. The clinical profile of stroke: a Yemeni experience, http://dspace.ju.edu.jo/xmlui/handle/123456789/33920 (2009, accessed 2015 May 28).
31. Sallam, Abdul-Rahman, Khalid Al Aghbari and Hesham A. Awn. "The Clinical Profile of Stroke: A Yemeni Experience." Jordan Medical Journal 43 (2010): 115-121
32. Kernan WN, Viscoli CM, Furie KL, et al: Pioglitazone after ischemic stroke or transient ischemic attack. N Engl J Med 374 (14):1321–1331, 2016. doi: 10.1056/NEJMoa1506930.
33. Unnithan AKA, Das JM, Mehta P. Hemorrhagic Stroke. [Updated 2023 May 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK559173/
34. López-Espuela F, Roncero-Martín R, Canal-Macías ML, Moran JM, Vera V, Gomez-Luque A, Lendinez-Mesa A, Pedrera-Zamorano JD, Casado-Naranjo I, Lavado-García J. Depressed Mood after Stroke: Predictive Factors at Six Months Follow-Up. Int J Environ Res Public Health. 2020 Dec 20;17(24):9542. doi: 10.3390/ijerph1
35. Hui C, Tadi P, Khan Suheb MZ, et al. Ischemic Stroke. [Updated 2024 Apr 20]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK499997/
36. Merck (Powers WJ, Rabinstein AA, Ackerson T, et al: 2018 Guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke 49 (3):e46–e110, 2018. doi: 10.1161/STR.0000000000000158. Epub 2018 Jan 24.
37. Harwood RH. The epidemiology of stroke. Brit J Cardiol. 2001;8(9):507-13.
38. Stegmayr B, Asplund K, Kuulasmaa K, Rajakangas AM, Thorvaldsen P, Tuomilehto J. Stroke incidence and mortality correlated to stroke risk factors in the WHO MONICA

Project. An ecological study of 18 populations. Stroke. 1997;28:1367-74.

39. Mirzajani M, Mirzaei M. Population attributable fraction of ischemic heart disease associated to hypertension in the Middle East and North Africa. JCHR. 2015;4(1):38-46.
40. Imano H, Kitamura A, Sato S, Kiyama M, Ohira T, Yamagishi K, et al. Trends for blood pressure and its contribution to stroke incidence in the middle-aged Japanese population: the circulatory risk in communities study (CIRCS). Stroke. 2009 May;40(5):1571-7. Epub 2009 Apr 2.
41. Motlagh B, O'Donnell M, Yusuf S. Prevalence of cardiovascular risk factors in the Middle East: a systematic review. Eur J Cardiovasc Prev Rehabil. 2009;16(3):268–280. doi:10.1097/HJR.0b013e328322ca1b.
42. Lee CM, Huxley RR, Lam TH, Martiniuk AL, Ueshema H, Pan WH, et al. Prevalence of diabetes mellitus and population attributable fractions for coronary heart disease and stroke mortality in the WHO South-East Asia and Western Pacific regions. Asia Pac J Clin Nutr. 2007;16(1):187-92.

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Original Research Article

Breast Self-Examination in Terms of Knowledge, Attitude, and Practice among Female Laboratory Students in 21 September University for Medical and Applied Sciences

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Abstract

Background: Breast self-examination (BSE) is simple, very low-cost, and noninvasive, with no special material/tool requirements. It is an effective diagnostic method for breast cancer that takes only five minutes to apply.

Aim of the Study: This study aimed to assess the level of BSE knowledge, attitude, and practice among female laboratory students in 21 September University for Medical and Applied Sciences.

Methodology: A descriptive, cross-sectional research method was used for conducting the study on a random sample of 100 female laboratory students selected from 21 September University for Medical and Applied Sciences. Data collected from the participants included their socio-demographic characteristics, knowledge level of BSE, attitude towards BSE, and practice level of BSE via a scale developed by the researchers. A pilot study was carried out to attain the validity of data.

Results: The results disclosed that 15% of the respondents had good overall knowledge of BSE, for which the major source of information about BSE (54.2%) was mass media. The findings also revealed that 75% of the participants had a positive attitude towards BSE, and 4% of them practice BSE every month, consistently. In addition, a significant difference between age and academic level was found in relation to the knowledge of BSE. At the same time, there was a significant difference between overall knowledge and practice of BSE (P=0.000).

Conclusion: The study outcomes unveiled that most female laboratory students at 21 September University for Medical and Applied Sciences have poor knowledge about BSE and do not perform BSE. Mass media is considered an important source of information about BSE to improve awareness among the community.

Keywords: Breast cancer, Breast self-exam, University students

Introduction

Breast cancer is the most common type of cancer among women living in both developed and developing countries and one of the most common causes of death among women in developing countries [1]. According to WHO (2020), breast cancer is the most common type of cancer. Breast cancer is the most common cause of cancer-related deaths among women worldwide [2]. According to the American Cancer Society [3] about 1.3 million women are diagnosed with breast cancer annually and about 465,000 die from the disease. In Western Asia number of new cases of breast cancer in women was 60715 (28.8%) in 2020 [4]. There is an upward trend in the incidence of breast cancer occurrence in developing countries consistent with the adoption of unhealthy Westernized lifestyles such as smoking, physical inactivity, consumption of calorie-dense food, changes in childbearing and breastfeeding, and exogenous hormonal intake [5،6]. Female breast cancer has surpassed lung cancer as the most commonly diagnosed cancer, with an estimated 2.3 million (11.7%). new cases In 2013, (2189) new cancer cases were reported in West Bank, (1127) cases were females (51.5%) and (1062) were males (48.5%) , females (51.5%) and (1062) were males (48.5%). Cancer incidence rate was (79.5) per 100,000 of the population. Breast cancer ranked first, with (401) reported cases (18.3%) from all reported cases. It is the highest among females and focuses on the age group between 20 - 59 [7]. The reported figures by MOH show a remarkable increase in cancer mortality in West Bank 2013 compared with 2007 and 2010, from (10.3%) in 2007 to (10.8%) in 2010. then increases to reach (13.3 %) from the total deaths in West Bank in 2013.

Moreover, breast cancer was the third leading cause of death among cancer mortality (9.1%) [8].

Similarly in Yemen, according to Globocan, the most commonly diagnosed cancer is breast cancer with an estimated 2894 new cases (17.6%) but with a higher mortality rate reach to 1638 (13.5%), compared to the mortality rate in developed countries. Breast cancer is considered the commonest Cancer causes death in Yemen [9]. It is the first of the five most common reported cancers among Yemeni people (16.8%), as well as among Yemeni women (31.6%) [10].and its incidence rate among Yemenis is dramatically growing during the last years [11]. It is also clear from cancer incidence

that issued by the Aden Cancer Center for Research and Registry [12]. Hadramout Cancer Center that Yemeni breast cancer patients like other breast cancer patients in the Arab countries (10) are almost 10 years younger than in the USA and Europe.

It has been estimated that more than 80% of breast cancer are associated with environmental factors that include exposure to contaminants, lifestyle, and diet[8] Although curative treatment for breast cancer is increasingly successful, early detection and treatment are critical in reducing mortality rates among women [2].

The knowledge and attitude towards breast cancer are low, such that the majority of the affected patients present late in the hospital when little or nothing can be done [12]. The three screening methods currently recommended by the American Cancer Society for early detection of breast cancer include clinical breast examination (CBE), mammography, and BSE [4]. BSE is a relatively simple, convenient, non-invasive, minimal-risk, and inexpensive method of early detection recommended for women. Women should begin this routine in their 20s to learn the look and feel of their healthy breasts so that they may report any changes in their breasts to a health expert immediately [5]. BSE allows women to perform the examination independently (i.e., without relying on a health care professional). It is also the only screening method available for women without access to professional health care services, particularly those who lack adequate health insurance [12]. BSE is a simple, very low-cost, noninvasive with no special material/tool requirements; and it is an effective diagnostic method for breast cancer that only takes five minutes to apply [7].

Females in Yemen constitute half of the population. This means that any hazardous agent affects women, mostly affects half of the population. Besides, women in Yemen play a crucial role in the socialization process, so it is very important to put hand in hand to fight against these hazards like breast cancer to get a very healthy present and future generation.

BSE has two-fold purpose: to make women familiar with both the appearance and the feel of their breasts, and to help women detect any changes in their breasts as early as possible. There is evidence that women who correctly practice BSE monthly are more likely to detect a lump in the early stage of its development, and early diagnosis has been reported to influence early treatment and yield a better survival rate [4].Unfortunately, despite the benefits of regular BSE, few women examine themselves; in fact, a majority does not even know how to do a BSE [13]. It is important to adequately motivate women to regularly carry out BSE to curtail the increasing mortality rate from breast cancer [14]. Regular BSE has been suggested as part of the overall health promotion concept [15]. The practice of BSE can help women to know the structure and composition of their normal breasts, thereby enhancing their sensitivity to detect any abnormality at the earliest time [16]. In many countries, there are cultural attitudes that make women feel uncomfortable receiving information about BSE from male healthcare personnel. In such situations, female laboratory students must have accurate information and positive attitudes about BSE and should perform it regularly by themselves. Therefore, they must be informed in detail about BSE and perform BSE correctly while in college so they can educate patients after graduation [17]. Additionally, laboratory students have a

responsibility to give instructions to other women on how to perform BSE correctly in primary healthcare settings.

Currently, there is no available data about BSE knowledge and practice among Yemeni laboratory students, or whether their education is sufficient to impart accurate information, positive attitudes, and BSE skills. Therefore, the current study aims to investigate the knowledge, attitude, and practice of BSE among female laboratory students at 21 September University for Medical and Applied Sciences. It also seeks to establish a baseline data for further research as well as for new curricular strategies about BSE.

Subjects and Methodology

1. Objectives of the Study

- To examine the knowledge, attitudes, and practice of BSE among female laboratory students at 21 September University for Medical and Applied Sciences.
- To find out if there is any association between students' knowledge of BSE and their socio-demographic characteristics.

2. Research Hypotheses

- There is a significant difference of knowledge on BSE at a level of (α=0.05) and the selected demographic data.
- There is a significant difference at a level of (α=0.05) between the knowledge and practice of BSE.

3. Research Questions

- What is the knowledge, attitudes, and practices of the female laboratory students toward BSE?
- What is the association between the knowledge level of BSE and selected demographic variables?

4. Variables

The independent variables were age, academic year, and family history of breast cancer. The dependent variables included knowledge, attitudes, and practices of palliative care.

5. Operational definitions

BSE: A monthly examination of breasts conducted by women following the five major steps of BSE, which include examining both the breasts for size, shape, color, and contour while looking in front of the mirror with their arms straight, on the hips, and over the head; to palpate or feel the breast both in standing and lying position using the three finger pads.

Knowledge: The facts/condition of knowing something with familiarity gained through experience or association. In this study, knowledge refers to the laboratory students' awareness of BSE as measured by a structured-knowledge questionnaire on BSE.

Laboratory Students: Female students who are studying Laboratory in 21 September University for Medical and Applied Sciences.

6. Study Design

A descriptive, cross-sectional explorative approach was used for conducting the current study.

7. Study Setting

This study was conducted in the Department of Laboratory affiliated to 21 September University for Medical and Applied Sciences

8. Study Period and Place

The study was conducted from 1st April to

31 August, 2022 in 21 September University for Medical and Applied Sciences.

9. Study Sample

A random sample was selected, adopting the systematic approach, where the first name was selected by the blind method and then the procedure was followed in the selection of each second name from the lists of the target participants.

The sample size was calculated (using the Epi info program) as 119 female laboratory students from a population size of 173 in different levels with a confidence level above 95%.

However, due to the constraints of time and resources, only 100 copies of the questionnaire were distributed to the students who agreed to participate in this study.

10. Inclusion Criteria

All female laboratory students at 21 September University for Medical and Applied Sciences showed willingness to participate in the study.

11. Tool of the Study

A self-administrative questionnaire was developed by the researchers to collect the socio-demographic data of the participants, such as age, academic year, family history of breast cancer, information about BSE and Menstrual cycle.

The knowledge part consisted of twenty close-ended questions on breast cancer, and BSE.

Validity and Reliability of the Study

Scoring system

The scoring system of participants' knowledge was done as follows: each question had a group of answer points, and one point was awarded for each correct answer; incorrect or I don't know answer took zero. Correct responses were summed up to get a total knowledge score for each participant. The total score for all questions reached 20 points. The knowledge scores were classified as:

Poor knowledge: less than 50% (the participant score <10 considered poor knowledge).

Fair knowledge: 50 - < 75% (the participant scores 10 – <15 are considered fair knowledge).

Good knowledge: 75% or more (the participant scores 15 and more are considered good knowledge).

The attitude part consisted of 13 items, each item had a group of answer points, 5 points for strongly agree, 4 points for agree, 3 points for uncertain, 2 points for disagree, and one point for strongly disagree.

The practice part consisted of 7 items, each item had a scale of answer points, 5 points for always, 4 points for usually, 3 points for often, 2 points for sometimes, and 1 point for never.

Regarding the tool validity, the questionnaire was refereed and validated by a panel of 5 experts in the academic and health field, who approved it with no further comments.

Pilot Study

In relation to data reliability, a pilot study was made, using similar subjects, the same setting, the same treatment, the same tool of data collection and analysis techniques.

The pilot study was conducted on ten female laboratory students in 21 September University for Medical and Applied Sciences to determine the clarity of questions, effectiveness of instructions, completeness of response sets, time required to complete the questionnaire and success of the data collection technique. Pilot subjects were asked to comment on the applicability and appropriateness (validity) of the questionnaire. All questions were approved to be clear enough with an estimated period of 10 minutes to complete the questionnaire.

Questionnaire Response Rate

The rate of response to the questionnaire was 100% of the total number of female laboratory students participated in this study.

Data analysis

Data were calculated and analyzed using the Statistical Package for Social Sciences (SPSS).

The level of significance (α) was set at 0.05. Descriptive and inferential statistical tests were used.

Ethical Considerations

his study was conducted after obtaining an official license from Family and Community Medicine Department at 21 September University for Medical and Applied Sciences. To maintain the welfare of the participating subjects, the questionnaire was distributed by fifth-year trained female medical students. Several procedures were utilized to protect the participants' rights. An oral verbal consent of the laboratory students was obtained before the administration of the questionnaire. Additionally, the participants were informed of the purpose of the study, and that they had the right to refuse to participate. Moreover, the voluntary nature of participation was emphasized, as well as confidentiality. Furthermore, the participants were told that they could refrain from answering any questions and they could terminate at any time. The anonymity of the participating subjects was maintained at all times

Results

The study targeted female laboratory students in 21 September University for Medical and Applied Sciences; 100 students participated in the study. The results of the statistical analysis are presented in main seven sections. The first section presents the assessment of the baseline characteristics of the targeted sample. The second section presents the assessment of the knowledge level of BSE. The third section focuses on the relationship between the mean of total knowledge of BSE and the examined variables. The fourth section addresses the participants' attitude towards BSE. The fifth section presents the assessment of the participants' level of practicing BSE. The sixth section focuses on the relationship between mean of total knowledge of BSE and age, academic

level, family history of breast cancer, information of BSE. The seventh section is devoted to the relationship between the mean of total knowledge and practice of BSE.

Description of the sample

Table 1: Base-line characteristics of the participants

Parameters		No.	%
Age	18-20 years	57	57
	Above 20 years	43	43
Academic year	First year	44	44
	Second year	27	27
	Third year	15	15
	Fourth year	14	14
Family history of breast cancer	Yes	17	17
	No	83	83
Information of BSE	Yes	59	59
	No	41	41
If yes	Mass-media-TV, Radio, Newspaper	32	54.2
	Contact with health personnel	10	16.9
	Information from relatives	2	3.4
	Other	15	25.4
Menstrual	Regular	80	80
	Irregular	20	20

Table 1 shows that 57% of the participants were within the age range of 18-20 years and 43% of them were within the age range above 20 years. It also shows that 44% of the participants were in 1st year, 27% in 2nd year, 15% in 3rd year, and 14% in 4th year. It can also be seen that 83% of them had not negative family history with breast cancer against 17% who had positive family history. In addition, the results show that 59% of the participants had received information about BSE and while 41% of them had not. The main source of information was mass-media (54.2%) including TV, radio and newspaper, followed by contact with health personnel (16.9%), relatives (3.4%), whereas other sources represented 25.4% of information source. Majority of the respondents (80%) were with regular menstrual cycle.

Level of knowledge about BSE

Table 2: Students' knowledge of BSE

Knowledge of BSE	No.	Percentage
Poor knowledge	45	45%
Fair knowledge	40	40%
Good knowledge	15	15%
Total	**100**	**100%**

Table2 shows that majority of therespondents (45%) had poor knowledge of BSE, while 40% of them had fair knowledge, and15% had good know-ledge about BSE.

Table 3: Students' knowledge level of BSE in terms of the examined variables

Parameter	Poor knowledge	Fair knowledge	Good knowledge	Total
Age				
18-20 year	33%	21%	3%	57%
Above 20 years	12%	19%	12%	43%
Academic level				
First year	28%	16%	0%	44%
Second year	13%	11%	3%	27%
Third year	4%	7%	4%	15%
Fourth year	0%	6%	8%	14%
Family history with breast cancer				
Yes	13%	2%	2%	17%
No	32%	38%	13%	83%
Information of breast self-exam				
Yes	15%	31%	13%	59%
No	27%	12%	2%	41%
Menstrual cycle				
Regular	37%	29%	14%	80%
Irregular	8%	11%	1%	20%

Table 3 discloses majority of students aged between 18-20 years (33.0%) had poor knowledge towards BSE while the majority of age above 20 years (19%) had fair knowledge. It also shows that most of first level and second level students (28% and 13%), respectively, had poor knowledge level of BSE, while many of level three students (7%) and majority of level fours students (8%) had respective fair a nd good knowledge of BSE. It can be observed that around one third of all students who respond yes for information of BSE had fair knowledge. Additionally, more than one third of students with regular menstrual cycle (37%) had poor knowledge of BSE and 29% of them had fair knowledge of BSE.

Attitude Towards BSE

Table 4: Students' attitude towards BSE

No	Items	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1	During BSE makes me feel so funny	57%	30%	6%	7%	0%
2	BSE will be embarrassing to me	40%	29%	(8%	19%	4%
3	Doing BSE is wasting the time	73%	24%	3%	0%	0%
4	Doing BSE makes me feeling unpleasant	43%	43%	8%	6%	0%
5	If there is lump, I prefer to get treatment from a traditional healer	40%	30%	15%	9%	6%

No	Items	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
6	Feel uncomfortable, can't do BSE once in a month	18%	31%	21%	23%	7%
7	All women should do BSE	5%	3%	8%	22%	62%
8	I really care about my breasts	8%	11%	17%	46%	18%
9	I'm not afraid to think about the breast cancer	29%	19%	19%	20%	13%
10	Avoid BSE because I am worries about having breast cancer	48%	21%	9%	16%	6%
11	Interested in doing BSE	21%	23%	33%	17%	6%
12	Always search for information regarding BSE from the internet, magazine, and newspaper	10%	15%	20%	40%	15%
13	Discuss with my friends about BSE	15%	23%	20%	34%	8%

Level of practicing BSE

Table 5: Students' practice level of BSE

No	Items	Never	Sometimes	Often	Usually	Always
1	Do BSE once a month	64%	16%	6%	10%	4%
2	learning the correct method of BSE	45%	17%	9%	15%	14%
3	Parents advise me to do BSE	62%	12%	14%	9%	3%
4	Advise friends to do BSE	45%	18%	15%	10%	12%
5	Discuss the importance of BSE with Friends	45%	22%	13%	9%	11%
6	Have been taught on BSE by health Staff	47%	16%	8%	12%	17%
7	If you notice any breast abnormality, directly go to public health care	24%	6%	12%	10%	48%

Table 5 reveals that majority of the participants (64%) do not perform BSE once a month whereas only 4% of them practice it constantly every month. It also shows that 45% of the participants reported never learning the correct method of BSE and 47% of them mentioned that they have been taught on BSE by health staff. In addition, 48% of the participants reported that they always go to public health care directly if breast abnormality is noticed. Moreover, 62% of the participants reported that their parents never advise them to do BSE and 45% of them never advise their friends to do BSE or discuss its importance with them

Correlation between knowledge towards BSE and the examined variables

Table 6: Correlation between mean of total knowledge and age, academic level, family history of breast cancer and information of BSE

Items	Mean of	N	S.D	F	Sig
Age					
18 -20 years	0.4737	57	0.18830	20.523	0.000
Above 20 years	0.6413	43	0.16559		
Academic level					
First year	0.4250	44	0.19485	17.295	0.000
Second year	0.5750	27	0.13752		
Third year	0.6667	15	0.13715		
Fourth year	0.7250	14	0.06430		
Family history of breast cancer					
Yes	0.4821	17	0.22154	1.564	0.214
No	0.5530	83	0.19181		
Information of BSE					
Yes	0.5958	59	0.15180	12.198	0.001
No	0.4605	41	0.22991		

Table 6 discloses a statistically significant relation between students' age group and academic level with total mean knowledge of BSE (p>0.000). It also shows a statistically significant relation between information of BSE with knowledge of BSE (p>0.001). On the other hand, no statistically significant relation was recorded between total mean knowledge of BSE and family history with breast cancer.

Correlation between knowledge and practice of BSE

Table 7: Correlation between the mean of total knowledge and practice of BSE

Items	Mean of	N	S.D	t.	*P*
Knowledge	0.5428	100	0.19672	19.466	0.000
Practice	2.3402	100	0.99455		

Table 7 reveals a statistically significant relation between knowledge and practice of BSE (p>0.000).

Discussion

Breast cancer is the most common type of cancer in women worldwide. That is why women's awareness of breast cancer is crucial. Accordingly, this study was conducted to evaluate the knowledge, attitudes and practice of BSE among female laboratory students who are going to be the future health personnel. The results revealed that the participants had limited knowledge about BSE; in which around 15.5% of them had good overall knowledge, lower than the results of a study conducted in Iraq, Mosul city (42.7%) [1]. This study was relevant in relation to age group as the participants fall within the age range of university students and emerging their adulthood. They are always eager to find out information about things happening around them hence a

deadly disease like breast cancer should not be strange to them as well as BSE, which has to do with looking out for changes on their own breast. More than one half of students (57%) in the present study aged between 18-20 years old, in comparison to 95.4% of participating students aged between 18-23 in a study conducted at Sharjah University, UAE [18]. Another study conducted in Gaza University, Palestine, revealed that negative family history with breast cancer reported as (75.6%) [19], lower than in the current study (83%). Around two thirds (59%) of the present study participants received information about BSE, which is lower than what was reported in a study made in Al-mukalla city (75.2%) [6]. The major source of information about BSE in this study was mass media (TV and radio) (54.2%). This finding is consistent with a study conducted among female students in Saudi Arabia that showed mass media as the main source of information about BSE for 39.8% of participants [1] and 68.8% in Nigeria [16]. Differently, a study in Sharjah University, UAE, reported social media as the main source of information for 57.2% of participants against 27.7% for mass media [20]. Media represents a main source of information about breast cancer and BSE; therefore, great efforts should be made to invest media to create awareness of breast cancer within the Yemeni community. This will help in emphasizing the importance of early detection of BSE among a large number of people in the community. On the other hand, the minor reported source of information was the relatives of the respondents (3.4%), which is lower than a study conducted among female students in Sharjah University, UAE (22.9%) [20]. This is one of the gaps existing in family life education as parents and care givers have no time to discuss pertinent health issues with their children. It may also be due to the fact that some of the parents have no information or knowledge on some of these topics and as such have little or nothing to discuss. The results also unveiled that less than half of the respondents (45%) had a poor knowledge of BSE that help in early detection of breast cancer. This finding is also in accordance with the study made in Mosul University, Iraq, which reported that 57.3% of participants had poor knowledge of BSE [1]. However, three quarters (75%) of the participants showed positive attitude towards BSE, with no negative attitude reported in the present study. These finding are similar to a study carried out at King Saud University in Saudi Arabia where the attitude of respondents to BSE was good (85.4%) [1]. The current study revealed that only 4.1% of the participants always practice BSE every month and 62.9% of them never performed it. These findings are in disagreement with a study made in Taif, Saudi Arabia, where 17% of respondents reported performing BSE monthly while 39% of them never performed it [9]. A statistically significant relation between age group and academic level with total mean knowledge of BSE (p=0.000) was recorded among the participants of this study. Another study conducted at Lagos Nigeria in Nigeria revealed statistically significant relationship between respondents' overall knowledge and level of study ($p< 0.05$), but no statistically significant relationship between the respondents' overall knowledge and age ($p > 0.05$). This could be attributed to the fact that (71%) of the total sample size in the current study were junior laboratory students (first and second year) who have not received in-depth knowledge of breast cancer yet. Additionally, a statistically significant

relation was found between overall knowledge and practice of BSE (P=0.000), which is similar to the study made in Taif University that revealed a positive correlation between overall knowledge and practice of BSE (P = 0.000) [9]. This illustrates the desire among this population to acquire correct knowledge regarding BSE. This finding also brings to light that if awareness and health education programs are conducted in an intensive and planned form, it might result in positive and healthy practice.

Conclusion

Based on the outcomes of this study, it can be concluded that although there is lack of knowledge about BSE among female laboratory students in 21 September University for Medical and Applied Sciences, their positive attitude towards it is encouraging. Additionally, it has been found that most students participated in this study do not perform BSE. However, there is a statically significant correlation between students' knowledge and practice of BSE.

Based on the findings above, it is recommended to create awareness about the importance of BSE amongst female laboratory students so as to improve its practice in the whole community. Furthermore, public awareness of the importance of BSE should be intensified using mass media, and health service personnel should promote BSE during their contact with female clients. In order to function as effective promoters of breast cancer control through early detection, laboratory students should possess the accurate knowledge and the appropriate attitude and practice concerning the disease and its early detection.

References

1. Abdullah Nasser Alomair1, Dania Ghazi Felemban, Mohannad Sami Felemban, Jameel Abdullah Awadain, Ammar Saud Altowairqi, Nawaf Fawzan Alfawzan1, Fatimah Mohammed Almazayen, Abdulrahman Jalwi Korkoman, Nawaf Saad Alrusayyis (2020) Knowledge, attitude, and practice of breast self-examination toward breast cancer among female students at King Saud University in Riyadh, Saudi Arabia, International Journal of Medicine in Developing Countries.
2. Al-Naggar RA, Al-Naggar DH, Bobryshev YV, Chen R, Assabri A (2011) Practice and barriers toward breast self-examination among young Malaysian women. Asian Pac J Cancer Prev. 2011;12(5):1173-8. PMID: 21875261.
3. Alomair, A. N., Felemban, . D. G., Felemban, . M. S., Awadain, . J. A., Altowairqi, . A. S., Alfawzan, . N. F., Almazayen, . F. M., Korkoman, . A. J. & Alrusayyis, . N. S. (2020) Knowledge, attitude, and practice of breast self-examination toward breast cancer among female students at King Saud University in Riyadh, Saudi Arabia. International Journal of Medicine in Developing Countries, 4 (2), 429-434.
4. American Cancer Society (2010) Breast cancer overview. Atlanta, GA: American Cancer Society. American Cancer Society. Cancer statistics. CA: Am Cancer J Clin 2002; 52: 10-11.

5. Ba Saleem HO (2013) Cancer incidence report (2007-2011) Aden Cancer Registry and Research Centre, Aden. Yemen.
6. Ba'amer Abobakar Ahmed(2010) Awareness and Practice of Breast Cancer and Breast-self Examination among University Students in Yemen, Asian Pacific J Cancer Prev, 10, 101-105
7. Beydağ KD, Yürügen B (2010) The effect of breast self-examination (Bse) education given to midwifery students on their knowledge and attitudes. Asian Pac J Cancer Prev. 2010;11(6):1761-4. PMID: 21338229.
8. Charlier CJ, Dejardin MT(2007) Increased risk of relapse after breast cancer with exposure to organochlorine pollutants. Bull Environ Contam Toxicol. 2007 Jan;78(1):1-4. doi: 10.1007/s00128-007-9010-4. PMID: 17333420.
9. -Dalal M. Nemenqani, Sahar H. Abdelmaqsoud, Al-Hanouf A. Al-Malki1, Abrar A. Oraija, Eiman M. Al-Otaibi (2014) Knowledge, attitude and practice of breast self examination and breast cancer among female medical students in Taif, Saudi Arabia, D. M. Nemenqani et al. / Open Journal of Preventive Medicine 4 (2014) 69-77.
10. El-Zaemey S, Nagi N, Fritschi L, et al (2012) Breast cancer among Yemeni women using the National Oncology Centre Registry 2004-2010, Cancer Epidemiol, 36, 249-53.
11. Ferlay J, Shin HR, Bray F, Forman D, Mathers C and Parkin DM. GLOBOCAN (2010) Cancer Incidence and Mortality Worldwide. IARC Cancer Base. Lyon, France: International Agency for Research on Cancer.
12. -Erblich, J., Bovbjerg, D. H., & Valdimarsdottir, H. B. (2000) Psychological distress, health beliefs, and frequency of BSE. Journal of Behavioral Medicine, 23, 277-292.
13. Maha Mishari Al-Sejari (2016) BSE Knowledge and Practice among Kuwaiti Women. (2013). BSE Practice and Breast Cancer Risk Perception among Female University Students in Ajman. Asian Pacific Journal of Cancer Prevention, Vol 14 (8): 4919- 4923
14. Hackshaw A.K. and Paulo E.A. (2003) Breast self examination and death from breast cancer a Meta Analysis, Br J Cancer, 88, 1047-53.
15. Plesnicar A., Kovac V. and Kralj B.(2004) Breast cancer and breast health awareness as an evolving health promotion concept, Radio Oncol, 38, 27-34
16. I.Y Ademuyiwa,1 E.J Oyira, 2 J. O Faronbi O.M Olajiga (2019). Knowledge, Attitude and Practise of Breast Self-Examination (BSE) among Female Students of the University of Lagos Nigeria. BJNHC Volume 1, Issue 2 November 2019 Pages 136 -148.
17. Memis S, Balkaya NA, Demirkiran F (2009) Knowledge, attitudes, and behaviors of nursing and midwifery
18. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F. Global Cancer Statistics (2020) Globocance stimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries, CA Cancer J Clin. 2021

May;71(3):209- 249. doi: 10.3322/caac.21660. Epub 2021 Feb 4. PMID: 33538338

19. 19-practices.Oncol Nurse Forum. Vol. 27: 810-835.
20. 20-Syed Azizur Rahman, Amina Al–Marzouki, Michael Otim, Nour El Hoda Khalil Khayat, Reham Yousef, Prama Rahman(2019) Awareness about Breast Cancer and Breast Self-Examination among Female Students at the University of Sharjah: A Cross-Sectional Study, Asian Pac J Cancer Prev, 20 (6), 1901-1908about Breast Cancer and Breast Self-Examination among Female Students at the University of Sharjah: A Cross-Sectional Study, Asian Pac J Cancer Prev, 20 (6), 1901-1908

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Case Report

Extraventricular Intraparenchymal Choroid Plexus Carcinoma in a Pediatric Patient: A Case Report

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Abstract

Background: This article reports a case of intraparenchymal, supratentorial, extraventricular choroid plexus carcinoma (CPC) in a pediatric patient.

Case Report: A 10-year-old girl presented with a 4-month history of chronic progressive headache, left hemiparesis, urine incontinence and blurry vision that deteriorated later to a complete blindness. A brain magnetic resonance imaging (MRI) demonstrated an intra-axial combined cystic and solid mass in the right frontal lobe with calcified foci. A gross total resection was performed followed by chemotherapy and Radiation therapy. The histopathological examination revealed the diagnosis of CPC. On serial MRI, a small newly developed focal enhanced recurrent lesion in the right frontal lobe, anteromedially to the previous surgical bed was identified after one year of follow-up.

Conclusion: This case reports the importance of early surgical management and continuous monitoring of extra- ventricular CPC by serial MRI to treat any recurrent lesion very early.

Keywords: choroid plexus carcinoma, pediatric, extraventricular, intraparenchymal.

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Introduction

Choroid plexus tumors (CPTs) are rare brain tumors that represents 2–5% of all pediatric brain cancers [1]. The annual incidence of all CPTs is approximately 0.3 per million individuals [2]. CPTs are histologically classified by the World Health Organization (WHO) into choroid plexus papilloma (CPP; WHO grade I), atypical choroid plexus papilloma (WHO grade II), and choroid plexus carcinoma (CPC; WHO grade III) [3]. CPC is an extremely rare malignant intracranial tumors [4]. CPCs mainly occur among children younger than 2 years. The median age is 1 year at diagnosis in comparison with CPP [5], 80% of all CPCs found in children. It represents about (20−40%) of all CPTs in pediatric patients [6]. CPC mainly arises within ventricles [7]. In extremely rare cases, they arise in locations outside of the ventricles, presumably from an ectopic choroid tissue [7]. For example, they may arise in cerebellum[8], cerebellopontine angle [9] or intraparenchymal brain tissue [10] [11]. Reviewing the related literatures about the origin of CPC reveals that only three previous studies reported an extraventricular Intraparenchymal origin for CPC in pediatric. To the best of the researchers' knowledge, this case is the fourth reported study among pediatric worldwide, and the first reported one in the Middle East.

Case Report

Clinical History: A 10-year-old Yemeni girl presented with a 4-month history of chronic progressive headache, which was associated with multiple attacks of vomiting. A 3-month period later to the onset of headaches, she started complaining of left hemiparesis and blurry vision on both eyes that markedly worsened over 1 month to a complete loss of vision. Then, she developed urine incontinence and became less playful. Associated symptoms included general malaise, and fatigue. No history of fever, chills, seizures, memory deficits, or behavioral changes was reported by her relatives. No history of medical illness or malignancies among her family was reported. Her family denied any history of congenital diseases or neoplasms.

Physical Examination: The girl was lethargic and disoriented. Her GCS when first seen was 13/15. She responded slowly when she was asked about her name. Her vital signs were within normal ranges. She was breathing spontaneously without any difficulties (Pso2= 95% on ambient air). Her heart rate was 88 bpm, temperature was 37C°, blood pressure was 90/60. She had a urinary catheter that was inserted in ER. The patient had left-sided body weakness. Her left side motor power was 3/5. She has normal full power in right side of body. She had a clear and fluent speech. Her cranial nerve examination demonstrated a total loss of the visual acuity with no light perception. Her fundoscopic examination revealed bilateral papilledema that was more on her right fundus. Other cranial nerves examination was within normal. Her sensory and cerebellar examinations were within normal. Meningeal irritation signs were normal. Other regional physical examinations were unremarkable.

laboratory: Findings of routine laboratory studies, including a complete blood count with differential and a basic chemistry panel, were within normal limits apart from low serum sodium.

Imaging Studies: Firstly, a contrast enhanced brain CT scan was performed, which demonstrated an intra-axial heterogenous enhanced mass measuring about (5x5x4cm) within the right frontal lobe with solid and cystic components with surrounding extensive hypodense vasogenic edema and midline shifting **(Figure. 1).**

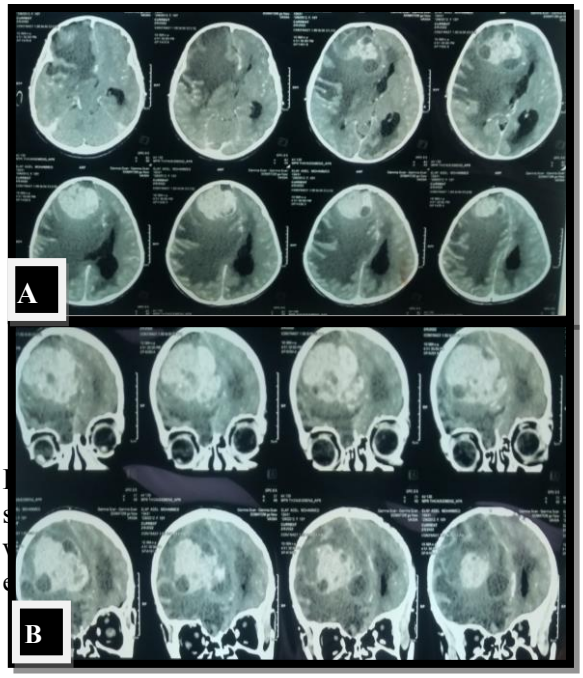

Figure 1: Contrasted Brain CT scan shows an intra-axial heterogenous mass within the right frontal lobe with surrounding extensive vasogenic edema and midline shift. **A:** Axial cuts, **B:** Coronal cuts.

Two days later, a brain magnetic resonance imaging (MRI) was performed. It demonstrated an intra-axial hyperintense mass within the right frontal lobe with a mixture of cystic and solid components and calcified foci, with severe suurounding vasogenic edema and midline shift about 1.6 cm to the left side and secondary non communicating hydrocephalus **(Figure 2)**

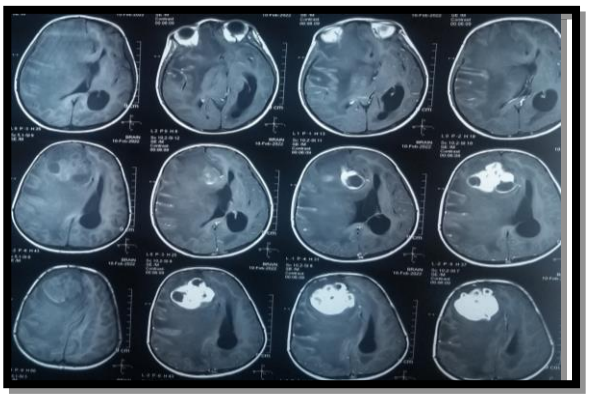

Figure 2: Brain MRI T1 (axial cuts) showing a mass within the right frontal lobe with surrounding extensive vasogenic edema and midline shift

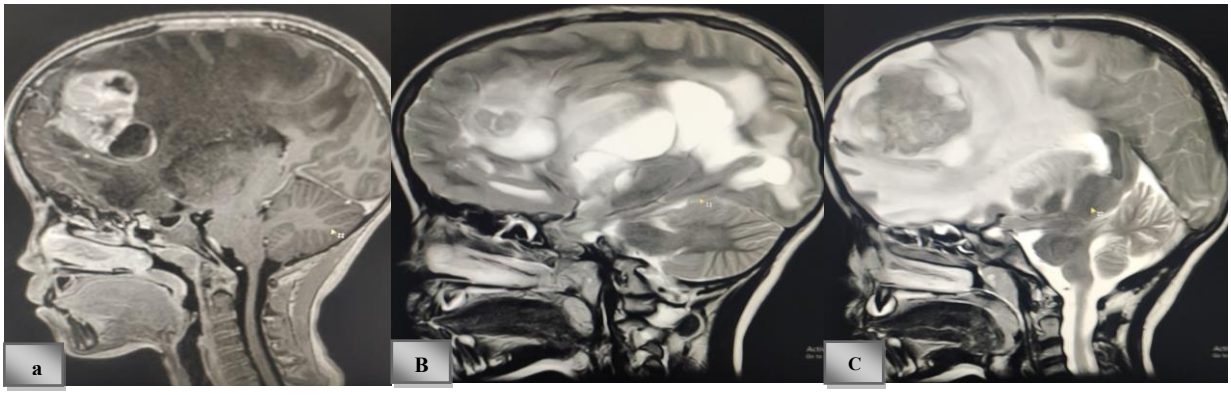

Figure 3: Preoperative contrasted Brain MRI (sagittal cuts) show a large heterogenous mass within the right frontal lobe (**A)** with extensive edema around the mass, (hyperintense in **T2** (**B&C**)

Management Plan

Initially, it was suggested that the patient's brain mass is a high-grade glioma based on neuroimaging studies. As the presentation of the patient was urgent, she was admitted immediately to the neurosurgical department at the 48 Model Hospital to be stabilized and prepared for tumor excision operation. The treatment plan was discussed with the patient's family. Surgery was planned for a craniotomy and excision of the tumor for histopathology, and may be insertion of a ventriculp-perotonial shunt or an External Ventricular Drain (EVD) if needed. Steroids were prescribed before the operation to relieve the vasogenic edema.

Pre-operative work-up

Full routine preoperative investigations were requested. A preoperative medical fitness by a multidisciplinary team formed by an anesthesiologist and pediatrician for pre-anesthesia evaluation of the patient were processed.

They advised for correction of hyponatremia before operation. A written consent was taken from the family for the craniotomy procedure. Two units of crossed-matched packed RBCs and two units of fresh frozen plasma were prepared. A V-P shunt and EVD devices were prepared. All operation instruments were checked in.

Operation

A C-shape skin incision in the right frontal area was extended to cross the midline over superior sagittal sinus (SSS). Craniotomy and elevation of bone flap using an electronic drill, and bone cutter. The dura was seen dusky and adherent to the skull bone. On opening of the dura, the brain was tense; an ill-defined mass with cystic and solid components was encountered immediately. Aspiration of the cystic part along with a near total excision of the mass by dissection of its margins from the brain tissue were made by cutting and coagulating of the marginal attachments while enfolding the tumor into the area and decompression with minimal retraction on adjacent brain, SSS and the falx

cerebri, with taking maximal care to the wall of the frontal horn of the right lateral ventricle, without opening it. Then the duraplasty was done followed by replacement of the bone flap, and scalp closure. The procedure passed very smoothly without any complications to the patient. The patient was extubated on the operation table, she regained her consciousness in the recovery room without any neurological deteriorations. Then, she was shifted to the neurointensive care unit for 24 hours under observation.

Post-operative Period Follow-up

On day zero, her left side motor power was 3/5 on both extremities. On the next day, a slight improvement of the left upper and lower extremities power that was 4/5, no dysphasia, her visual acuity was no perception to light. The drain container contained only a few millimeters of serous fluid, so the drain was removed after 14 hours of the operation. An immediate control brain CT-scan was requested done that revealed a parenchymal defect on the right frontal lobe with minimal pneumocephalus at surgical bed without any significant hematoma. The residual tumor could not be seen clearly on the right frontal lobe. On the second post-operative day, the left side of body powered the same of the 1st day. The patient was able to formulate the speech, oriented, and her visual acuity was improved up to hand movement. She was shifted to the ward. Her daily clinical progress in the ward on next couple of days was smooth.

Another control brain CT scan performed 1 week after resection demonstrated a cavity without identifiable tumor and partial resolution of the cerebral edema. No significant changes were found in comparison to the first post-operative imaging. The patient was discharged home on Day 4 with a good general condition. Instructions were giving to her family.

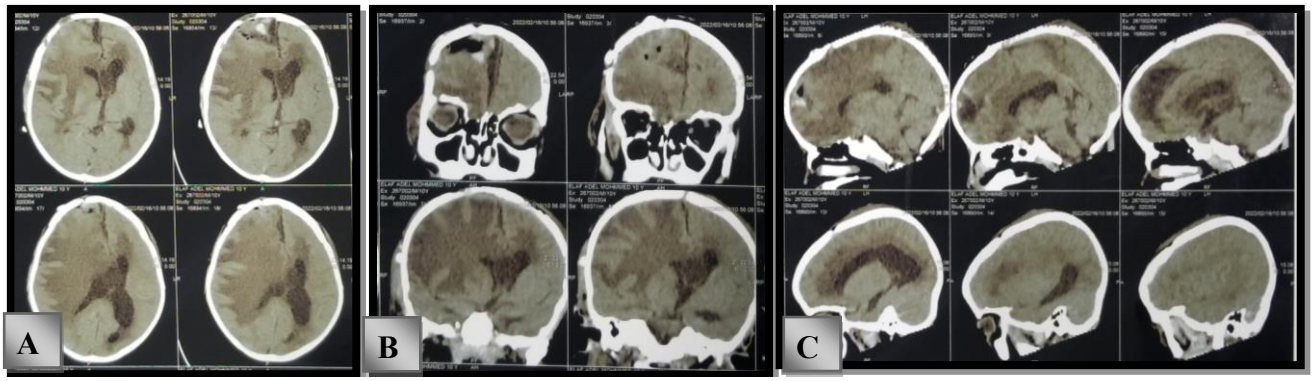

Figure 4: Control Brain CT scan on Day 1 post-operation. A: Axial cut, B: Coronal cut, C: Sagittal cut.

Pathological Examination

Figure 5: Gross picture of the tumor

Gross examination of the fresh tumor specimen was significant for multiple pieces of white-tan soft and friable tissue measuring 5 x 5 x 2 cm. Figure 5 The tissue was fixed in 10% formalin and processed for paraffin embedding. The paraffin blocks were sectioned at 4-m intervals, and these sectionswere stained with hematoxylin and eosin for microscopic examination .

Histologically, it demonstrated an ill-defined tumor proliferation composed of sheets and papillary configurations of atypical polygonal to stellate cells with patchy aggregates of large bizarre multinucleated forms. The tumor cells show abundant pale and eosinophilic to clear/foamy cytoplasm, irregular vesicular nuclei, and prominent nucleoli with frequent mitotic figures, wide areas of geographic necrosis, and few calcifications. This pathological was consistent with choroid plexus carcinoma (CPC) WHO grade III. The patient was referred to the Yemeni National Oncology Center. She started receiving an adjuvant chemo/radiotherapy treatment.

Serial MRI studies of the head and spine with gadolinium contrast administration were performed periodically in the outpatient setting. After Serial MRI control studies of the brain and spine with gadolinium contrast administration were performed periodically at the first, fifth and eighth months post surgery in the outpatient setting, both brain and spinal MRI were normal apart from previous surgical changes and eight months to the surgical resection, both brain and spinal MRI were normal apart from previous surgical changes.

One-year post tumor resection, the brain MRI showed a newly developed small focal enhanced area in the right frontal lobe, just anterior and medial to the surgical bed and measuring about 1.7x1.5x1.8 cm, which suggests a recurrent lesion.

Discussion

Choroid plexus tumors typically arise typically within ventricles. They form only a small number of brain tumors. Sometimes, they may arise from unusual extraventricular tissues as intraparenchymal cerebral tissue. Choroid plexus carcinoma is a high grade tumor which occurs predominantly in pediatric. Extraventricular CPC is extremely rare. Only a few number of pediatric patients with extraventricular CPCs were reported [10,11]. The first two cases reported a CPC, presenting an intraparenchymal CPC, were occurred in young girls, both of them were 6-year-old and within the frontal lobe [10,12]. The first CPC case located in the left frontal lobe, reported in 2001 by Carter et al. [10]. The second case situated in the right frontal lobe, reported in 2009 by Stevens et al. [12]. Another case was reported in 2021 in a 15-year-old teenager with an intraparenchymal CPC located mainly within the left frontal lobe [11].

Our case occurred in a 10-year-old girl presenting as intraparenchymal mass within

the right frontal lobe. The exact mechanism for the origin of this extraventricular tumor is still unknown. Some publications suggested theories and possible causes on how this tumor arise from unusual extraventricular location. The existence of primitive ectopic secretory choroid plexus epithelium in extraventricular brain tissues was suggested as a possible cause [13,14]. It may also arise from ependymal tissue that was separated during later stages of brain development [15].

The diagnosis of this case was not very easy because the radiological picture and the location of the mass made us suggest that the diagnosis is most likely to be an astrocytoma or high grade glioma with a wide variety of differential diagnosis for histopathology. After confirmation of the diagnosis by histopathology, the patient had to be taken to Oncology center to start chemotherapy and radiation therapy. In the beginning, the patient showed a very good outcome. However, with follow up by serial MRI, the patient had recurrence, which is something expected as it occurred in most brain lesions. In comparison, a previously reported case of extraventricular CPC showed similar recurrence 3 months post operation [10]. In some studies of usual CPTs, it was found that CPC is 20 times more likely to recur after treatment than other CPTs [16].

We faced multiple difficulties during the follow-up of this case. On the one hand, the family of the patient is of a low class and live in a far rural area located at the site of conflict and war. There are no near neuroimaging facilities around their residence. The cost of serrial neuroimaging beside the cost of traveling to our institution both made the regular follow-up very difficult. On the other hand, there was a period of time in which we lost the communication with the family and came lately with a recurrent lesion. Moreover, this type of cases needs to be monitored very closely with serial MRI to treat any recurrent lesion very early.

Conclusions

This study is made on a case of extraventricular, intraparenchymal CPC, presented as an emergency case with a huge mass, midline shift and hydrocephalus. Proper diagnostic facilities like histopthology plays an essential role in establishing the diagnosis of CPC. Furthermore, a complete to near complete excision of the CPC in extraventricularlocation followed by adjuvant Chemotherapy shows promising results. MDT is an important step to maximize the benefits for the patient and enhance the outcome. The regular follow up with serial MRI can identify the recurrence early as CPC has higher rate of recurrence. The unique presentation of this rare extraventricular CPC provides insight for the diagnosis and treatment of other rare instances of CPTs. More studies about this cancer with unusual locations are very important to be published to improve the outcome and to know the various presentations and complications of every case.

Informed Consent

A written informed consent was obtained from the patient's family members for publication of this case report and

accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request**.**

Conflict of interest statement

The authors declare that the article content was composed in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

1. C. Snider, J. H. Suh, and E. S. Murphy, "Choroid plexus tumors," Adult CNS Radiation Oncology: Principles and Practice, pp. 299-306, 2018.
2. J. Wolff, M. Sajedi, R. Brant, M. Coppes, and R. Egeler, "Choroid plexus tumours," British journal of cancer, vol. 87, pp. 1086-1091, 2002.
3. D. N. Louis, A. Perry, G. Reifenberger, A. Von Deimling, D. Figarella-Branger, W. K. Cavenee, H. Ohgaki, O. D. Wiestler, P. Kleihues, and D. W. Ellison, "The 2016 World Health Organization classification of tumors of the central nervous system: a summary," Acta neuropathologica, vol. 131, pp. 803-820, 2016.
4. P. Gopal, J. R. Parker, R. Debski, and J. Parker, Joseph C, "Choroid plexus carcinoma," Archives of pathology & laboratory medicine, vol. 132, pp. 1350-1354, 2008.
5. S. Lam, Y. Lin, J. Cherian, U. Qadri, D. A. Harris, S. Melkonian, and A. Jea, "Choroid plexus tumors in children: a population-based study," Pediatric neurosurgery, vol. 49, pp. 331-338, 2015.
6. A. Mishra, C. Srivastava, S. Singh, A. Chandra, and B. Ojha, "Choroid plexus carcinoma: Case report and review of literature," Journal of pediatric neurosciences, vol. 7, pp. 71-3, 2012.
7. Q. T. Ostrom, N. Patil, G. Cioffi, K. Waite, C. Kruchko, and J. S. Barnholtz-Sloan, "CBTRUS statistical report: primary brain and other central nervous system tumors diagnosed in the United States in 2013–2017," Neuro-oncology, vol. 22, pp. iv1-iv96, 2020.
8. N. M. Duc, "A Unique Case of Cerebellar Choroid Plexus Carcinoma," Canadian Journal of Neurological Sciences, vol. 48, pp. 555-556, 2021.
9. A. J. Witten, S. K. Mendenhall, L. S. DeWitt, A. Vortmeyer, and A. Cohen-Gadol, "Cerebellopontine angle primary choroid plexus carcinoma present in an adult: case report and literature review," Cureus, vol. 13, 2021.
10. A. B. Carter, D. L. Price, K. A. Tucci, G. K. Lewis, J. Mewborne, and H. K. Singh, "Choroid plexus carcinoma presenting as an intraparenchymal mass: Case report," Journal of neurosurgery, vol. 95, pp. 1040-1044, 2001.
11. R. A. Hartanto, D. A. Tamba, N. H. Setyawan, E. Ekaputra, R. G. Malueka, I. S. K. Harahap, and E. K.

Dwianingsih, "Extraventricular Choroid Plexus Carcinoma with Spinal Metastasis: A Case Report," Open Access Macedonian Journal of Medical Sciences, vol. 9, pp. 93-98, 2021.

12. E. A. Stevens, C. A. Stanton, K. Nichols, and T. L. Ellis, "Rare intraparenchymal choroid plexus carcinoma resembling atypical teratoid/rhabdoid tumor diagnosed by immunostaining for INI1 protein: Case report," Journal of Neurosurgery: Pediatrics, vol. 4, pp. 368-371, 2009.
13. A. P. Lozier, Y. M. Arbaje, and B. W. Scheithauer, "Supratentorial, extraventricular choroid plexus carcinoma in an adult: case report," Neurosurgery, vol. 65, pp. E816-E817, 2009.
14. N. I. Azzam and W. R. Timperley, "Intracerebral cyst due to ectopic choroid plexus: case report," Journal of neurosurgery, vol. 55, pp. 651-653, 1981.
15. R. C. Greene, "Extraventricular and intra-cerebellar papilloma of the choroid plexus," Journal of Neuropathology & Experimental Neurology, vol. 10, pp. 204-207, 1951.
16. C. Bettegowda, O. Adogwa, V. Mehta, K. L. Chaichana, J. Weingart, B. S. Carson, G. I. Jallo, and E. S. Ahn, "Treatment of choroid plexus tumors: a 20-year single institutional experience," Journal of Neurosurgery: Pediatrics, vol. 10, pp. 398-405,2012

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Case Report

Application of AI-Driven 3D Smile Design (REBEL) in Patient-Centered Prosthetic Treatment: A Case Report (Case 3)

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Abstract

A smile is more than just pearly whites. A unique combination of shapes, textures, and colors speaks volumes about a person. Dentists are moving beyond traditional methods to create "smile designs" that consider not just biology and function, but also aesthetics and emotional expression. This holistic approach creates a harmonious smile, the "fifth dimension," that reflects a person's personality and boosts their confidence. A beautiful smile isn't just about looks; it's about empowering a person to function better socially and psychologically.

Keywords: Artificial Intelligence (AI), Digital Smile Design, REBEL/ visagSMile software, Esthetic Dentistry.

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Introduction

A smile is more than just pearly whites; it's a unique canvas reflecting a person's individuality. The shapes, textures, and colors of the teeth, along with the lips, come together to form a masterpiece of expression [1]. Designing a smile goes beyond the traditional approach. It's a symphony of various elements – biology, structure, function, and esthetics – working harmoniously to create a visually stunning and functionally sound smile. This holistic perspective elevates smile design to a whole new level [1].

A dentist acts as an artist, translating a patient's desires and personality into a smile that complements their facial features. This translation can be achieved through creative techniques, whether by analog methods or with the aid of digital tools.

Ultimately, a smile is a powerful tool for both social interaction and emotional expression. By carefully crafting a smile design, dentists empower their patients to confidently express themselves and navigate the world with greater ease [2].

Studies [3] suggest that a balanced and pleasing smile (harmonious smile) might be linked to both higher self-esteem and stronger social skills. This implies that a harmonious smile could make someone feel more confident and interact more effectively in social situations.

Your smile is powerful! It can influence how others see you and even how you feel about yourself [4].

To create a smile that makes you shine, dentists consider what kind of look you're going for. This includes things like your personality, social life, and education level [1,3]. There are special computer programs dentists can use to design smiles, but none of them take your personality into account [5].

The secret to a perfect smile makeover starts with knowing your ideal smile. By working together, you and your dentist can create a personalized plan to bring that vision to life. Before initiating any treatment, it is necessary to visualize the desired outcomes. It then becomes possible to formulate the steps required to achieve this result [3].

Intraoral scanning for the mock-up

To help you visualize your new smile, we used a special scanner to take a digital impression of your teeth. This allows us to create a temporary replica, called a mock-up, that we can place directly in your mouth. This way, you can see the full look and feel of your restored smile, including the length and positioning of each tooth, before any permanent changes are made. (Figure. 1).

Figure. 1. After capturing a digital scan of the teeth with an intra-oral scanner that creates an STL file, the dentist can then fabricate the mock-up.

The Aesthetic Pre-evaluative Temporaries (APT)

Before any tooth modification begins, dentists can create a realistic preview of the final smile design.

1. The dentist and patient collaborate on a preliminary design using a direct mock-up.
2. If approved, a detailed wax-up model is created in the lab based on this design.
3. Back at the dental office, a temporary replica (APT) made of clear resin is crafted using the wax-up as a mold.
4. This temporary replica is placed on the patient's teeth without anesthesia or tooth preparation.

This APT allows for final adjustments to the design based on the patient's experience and appearance before any permanent changes are made.

Smile design and self-identification

Over the years, dentists and dental technicians have tried to use all the basic esthetic rules to correctly create new smile designs for patients. These rules represent the fundamental keys and should set the style of any smile design. However, sometimes, the final esthetic results fail to meet the patient's expectations due to a disharmony between the smile design and the patient's sense of self-identity. High patient expectations have driven this profession to reassess the customization of new smile designs, which need to take into consideration the individual psychological characteristics of each patient. If this aspect is ignored, it may lead to the patient's dissatisfaction with the outcome [2].

The fifth dimension of the smile

The smile design in dentistry so far till recent years has been based on four dimensions: biology, structure, function, and aesthetics. The esthetic parameters were dependent on age, gender, and sex. However, in reality, none of these dimensions took into consideration the personality of the patient, even though a 'perfect' smile design should reflect this. Patient identity, which includes personality, is therefore the fifth dimension of the smile [1].

The objective is always to create not just a satisfied patient response to the smile design, but one of amazement because the new smile reflects the patient's personality and emotional needs/feelings (ie, it takes into account the fifth dimension of the smile). This makes the present approach quite different from the traditional one. The key to this translation of the patient's personality and feelings into the new smile design is visual language [1].

Visual Language

Each type of line or shape has a specific emotional meaning.

Lines represent the most basic elements of visual language. Horizontal lines, because they conform to gravity, express stability, passivity, and calmness. In contrast, vertical lines represent the movement of

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the point against gravity, expressing strength and power, just as inclined lines arouse the sensation of instability, tendency to movement, and dynamism. Curved lines are associated with delicacy, sensuality, and feminine gender (Figure. 2a-d) and (Figure. 3a-d).

The combination of lines generates the most basic forms, transferring to them their expressions. Thus, the vertical rectangle expresses strength by the predominance of the vertical element on the horizontal, the triangle dynamism, the oval delicacy, the square stability, and immobility by the balance between its vertical element and the horizontal one. These basic shapes can be observed in the facial contour as well as in the shapes of the incisors and the three-dimensional conFigureuration of the dental arrangement [6].

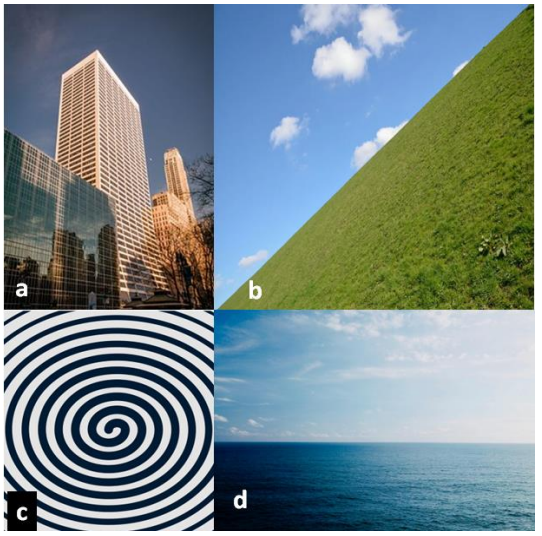

Figure. 2a-d. (a) vertical lines and rectangular shapes express strength due to the predominance of the vertical element on the horizontal the inclined lines and triangular shapes express dynamism (b). the oval and round snape express delicacy (c), and the horizontal line expresses stability and immobility due to the balance between the vertical and horizontal elements (d).

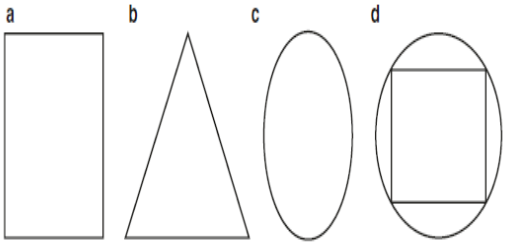

Figure. 3a-d. (a) vertical lines and rectangular shapes express strength due to the predominance of the vertical element on the horizontal the inclined lines and triangular shapes express dynamism (b). the oval and round snape express delicacy (c), and the horizontal line expresses stability and immobility due to the balance between the vertical and horizontal elements (d). (Quoted from Springer Nature Switzerland AG 2020 235 [6], Esthetic Oral Rehabilitation with Veneers)

The knowledge of the visual language is therefore applied to the main expressive elements of a smile design (dental shapes, incisal edge, interdental ratio dominance, and 3D positioning of the teeth in the arch). It determines the following four smile design types (Figure. 4).

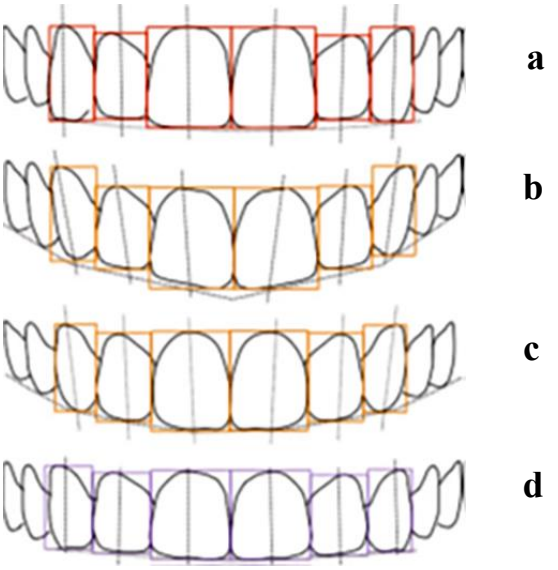

Figure. 4. The visual language knowledge applied to the main expressive elements of smile design such as dental shapes, incisal edge, interdental ratio or dominance, and 3D positioning of the teeth in the arch determined four smile design types with primary expression, from top to bottom: strong,

dynamic, delicate, and calm (Quoted from Springer Nature Switzerland AG 2020 235 R. D. Trushkowsky (ed.) [6], Esthetic Oral Rehabilitation with Veneers).

Strong: The design is composed mainly of rectangular dental shapes, strong dominance of the central incisors and canines on the lateral incisors (radial symmetry) as well as plane incisal edge and rectilinear 3D dental positioning on the arch in the occlusal view
(Figure 4 a).

Dynamic: Triangular or trapezoidal dental shapes, standard dominance, inclined incisal edge, and angled 3D dental positioning on the arch (Figure 4 b).

Delicate: Oval dental shapes, medium dominance, curved incisal edge, and standard 3D dental positioning (Figure 4 c).

Calm or stable: Smoothly rounded square dental shapes, weak dominance (current symmetry), horizontal incisal edge, and 3D rectilinear or standard dental positioning on the arch (Figure 4 d).

The Rebel software

Imagine a dental software that uses artificial intelligence to design your perfect smile. Rebel does exactly that! It takes into account not just your teeth and face, but also your personality.
Here's how it works:

- You take a picture and answer some questions. This helps Rebel understand your facial features and preferences.
- Rebel analyzes your personality using established tests.
- It then uses this information to create a 2D smile design that complements your unique characteristics.
- This 2D design is then transformed into a 3D model you can see on screen.

Rebel essentially translates your personality and desires into a beautiful, custom smile design [7].

Case presentation

A man of age 25 required esthetic prosthetic rehabilitation of his teeth. The patient was dissatisfied with his smile due to his discolored and chipping teeth. The aim of the esthetic treatment was therefore to enhance his smile (Figure. 5a-c) by utilizing the Rebel software as described above to create the most natural and personalized smile design possible, following a minimally invasive approach.

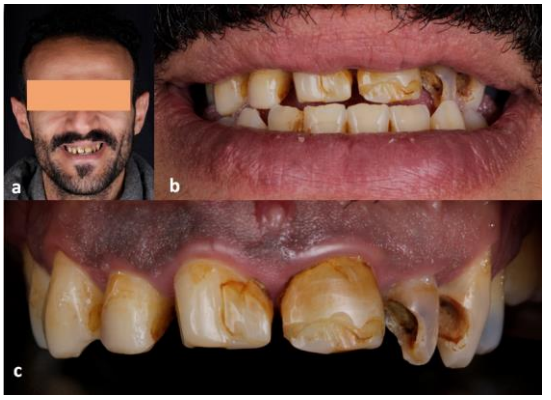

Figure. 5a-c. Intraoral view shows the discoloration of teeth, badly carious, and fractured teeth.

Esthetic Analysis and Rebel Simplicity

Esthetic design can be challenging for clinicians and dental technicians. Rebel (Visagismile) is a recent digital

previsualization technique that allows the dentist to:

– Perfectly design the new smile.

– Improve the communication between the dental team members involved in the treatment;

– Obtain better communication and achieve better patient motivation; and

– Visualize the final esthetic result even before the treatment is started.

3D Rebel smile design plays an important role in the overall treatment planning and will guide the actual clinical treatment.

This method makes it possible to share the treatment plan among team members and to create a 3D visualization of the case in the patient's mouth. The digital project will be tested and approved before starting the actual treatment. Accordingly, it will allow the dentist to present the appropriate therapeutic solutions.

Esthetics-based treatment planning

A workflow for an esthetic case starts with the collection of the data, history of the patient, clinical findings, X-rays, models, photos, and maybe videos. Then one of the most important parts of the whole step is to start communicating with the patient regarding their expectations from this esthetic treatment [6, 8].

The treatment planning then should be based on the final expectations of the patient. And the treatment should be sequenced and executed accordingly.

The most important step of the workflow is the design part; however, at this stage, verbal communication is not enough. Any esthetic procedure is very subjective, and without materializing the esthetic smile design, it will not be possible for the dentist to explain what he/she would want to deliver to the patient at the end of the treatment (Figure. 6).

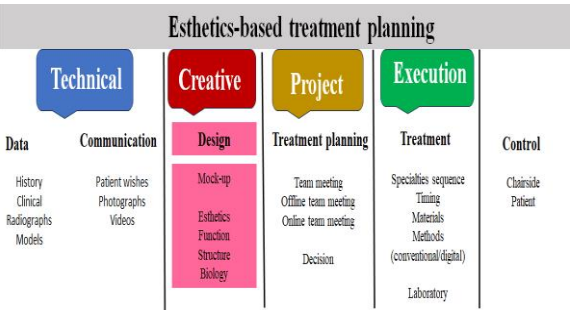

Figure. 6. The most important part of the workflow is the design part. This is the heart of any esthetic treatment that will differentiate a more committed dentist from an average one. The final esthetic smile design and treatment planning should also be based on this mockup, which should fulfill the expectations of the patient.

The Rebel workflow

Rebel provides the simplest steps for transferring all the necessary information to the Rebel digital laboratory [10].

These are the three mandatory steps:

1. Single central incisor mock-up and intraoral digital scanning.
2. A full-face photographic protocol.
3. A Simple interview/questionnaire.

1. Single central incisor mock-up and intraoral digital scanning

In certain circumstances, a composite mock-up is performed on one (or two) of the central incisors to identify the incisal edge position vertically and the position of

the facial surface buccolingually. In this case, the central incisor mock-up is not indicated.

2. Full-face photography protocol

The software needs to have a five full-face photography protocol to get the facial recognition of the patient and relate the 3D intra-oral digital scan to the facial features. The mandatory five full-face pictures are the following (Figures. 7a–e.).

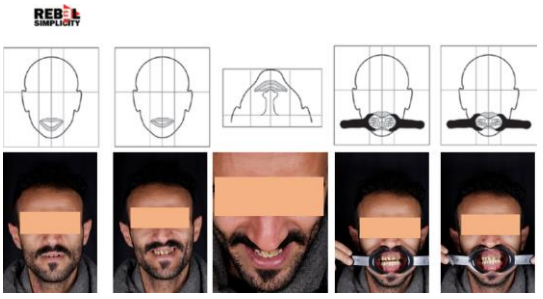

Figure 7a–e. The full-face photography protocols. Five mandatory photos need to be taken: (a) smiling; (b) lips at rest; (c) 12 o'clock position; (d) retracted mouth open, and (e) retracted mouth closed.

Full-Face Smiling

Keep the patient in the same position with the eyes open and parallel to the horizon and keep the head upright (NOT tilted to the right, left, up, or down). This time ask the patient to keep the lips apart with a soft smile (if possible, show the incisal edges of the maxillary incisors).

a- Full-Face Rest Position

This photo is for the automatic facial recognition part of the software, and part of the new REBEL smile design will be based on this facial perception of the patient.

Technically, the forehead and the ears of the patient must be visible. If the patient has long hair, please keep it away from the face. It is crucial to keep the head upright (NOT tilted to the right, left, or up and down), preferably position the eyes parallel to the horizon, and keep the lips apart.

b- Face 12 O' Clock Position

There are two simple ways of taking this specific photo.

The first and easiest choice will be to keep the patient in the same position and ask him/her to bend the face 45° forward while having a full smile and take a photo that will show the relationship to the upper centrals and the displayed arch position to the lower lip line.

Or the dentist can lay down the patient into a supine position on the dental chair and move him/herself to 12 o'clock position ask for a full smile and take a photo from 45°.

c- Full-Face Retracted Open Mouth

The patient should be asked to hold the full mouth retractors, again keeping the position of the eyes parallel to the horizon, keeping the head upright (NOT tilted to the right, left, or up and down), and keeping the mouth open (upper jaw and lower jaw) separated.

d- Full-Face Retracted Open Mouth

The same protocol above should be repeated, however, this time with the teeth (upper jaw and lower jaw) closed.

3. Simple interview/questionnaire.

The interview was performed which indicates the character and the personality of the patient and was completed in less

than a minute through a questionnaire in the software and gave the primary and complementary character of the patient.

The temperamental type of everyone is defined by a unique combination of diverse characteristics of the four main temperaments. Therefore, for a precise and practical evaluation of it, it is necessary to apply a specific questionnaire (Figure. 8).

The optimal tooth shape is determined with the help of the interview. The questionnaire is based on popular psychological tests for personal self-assessment.

The first question is an adapted test by Dellinger, and the other three questions concern personality traits based on the theory and questionnaire by Eysenck [9]

The data resulting from the interview/questionnaire are checked by an algorithm in the software, which automatically calculates the patient's temperament and personality. The temperament will be a combination of strong, dynamic, delicate, and calm. After this procedure, the dentist

and dental technicians will have a complete assessment of the patient's facial perception and personality (Figure 9 and 10).

When the entire Rebel workflow is completed, the software guides the dentist to exit, and with a mouse click, the file is immediately sent to the Rebel digital laboratory.

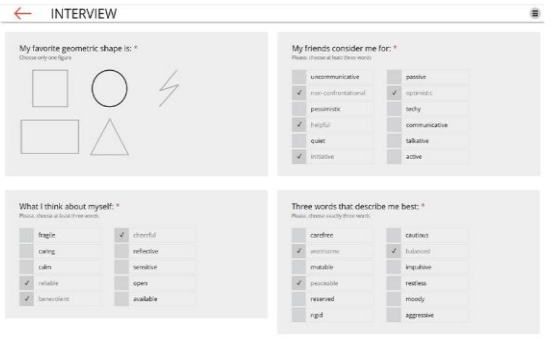

Figure. 8. Based on the data from the interview, the software algorithm automatically calculates the temperament (personality), and the way the patient wants to be perceived. The temperament combines strong, dynamic, delicate, and calm.

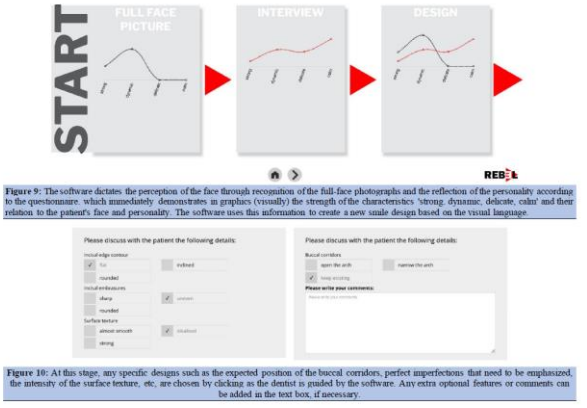

Figure 9. The software dictates the perception of the face through recognition of the full-face photographs and the reflection of the personality according to the questionnaire. which immediately demonstrates in graphics (visually) the strength of the characteristics 'strong. dynamic, delicate, calm' and their relation to the patient's face and personality. The software uses this information to create a new smile design based on the visual language.

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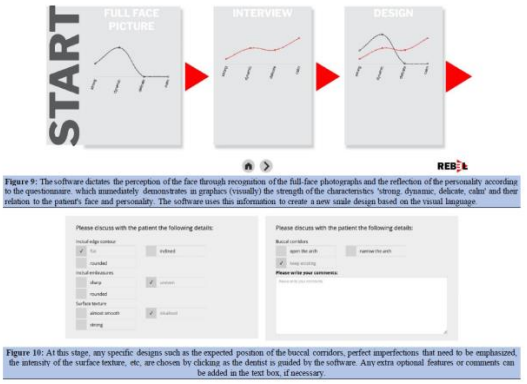

Figure 10. At this stage, any specific designs such as the expected position of the buccal corridors, perfect imperfections that need to be emphasized, the intensity of the surface texture, etc, are chosen by clicking as the dentist is guided by the software. Any extra optional features or comments can be added in the text box, if necessary.

Rebel digital laboratory

The next step was the conversion of the 2D digital project into a 3D mock-up through the Rebel digital laboratory and the creation of a digital wax-up, The Al-based algorithms of the software decided on the main elements of the new smile, It also chose the ideal (most natural) individual tooth shape relative to the facial perception and personality of the patient. Once this design is automatically placed over the digitally scanned original maxilla of the patient and rendered, an STL file of this new digital wax-up is made.

Back to chairside/3D printing

The STL file was then sent to the dentist via email, ready to be 3D printed (Figures. 11a and b). Once a 3D-printed model is made, then it easily transfers the design to the patient's mouth by making a silicone impression of the digital wax-up, duplicating all the details such as the line angles that give the teeth their ideal shape, surface texture, etc. The harder this silicone transfer impression, the more precise the transfer will be (Figures. 12a and b), This transfer should be done before anything else, ie, the dentist should evaluate the new design (as the APT or final mock-up) well before starting the tooth preparation (Figure. 13 a and b), Not only does this achieve the ideal 3D smile design, but it also creates a great opportunity for the dentist to communicate the 3D smile design to the patient, The final esthetic design was approved at this point.

After this esthetic approval, some adjustment was carried out on the occlusal surfaces, the final functional digital wax-up was completed with digital software that can deliver these additional changes, using the esthetic smile design (created by Rebel) as a base.

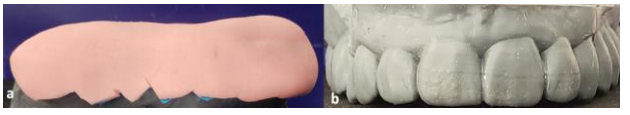

Figure 11. a and b. The STL file is received via email from Rebel Digital Laboratory and is 3D printed.

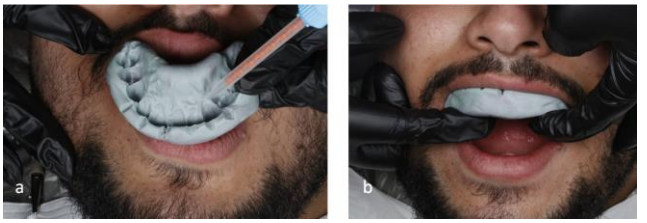

Figure 12. a and b. Once a 3D-printed model is made, then it easily transfers the design to the patient's mouth using a silicone impression of the digital wax-up that is created using a provisional material of choice.

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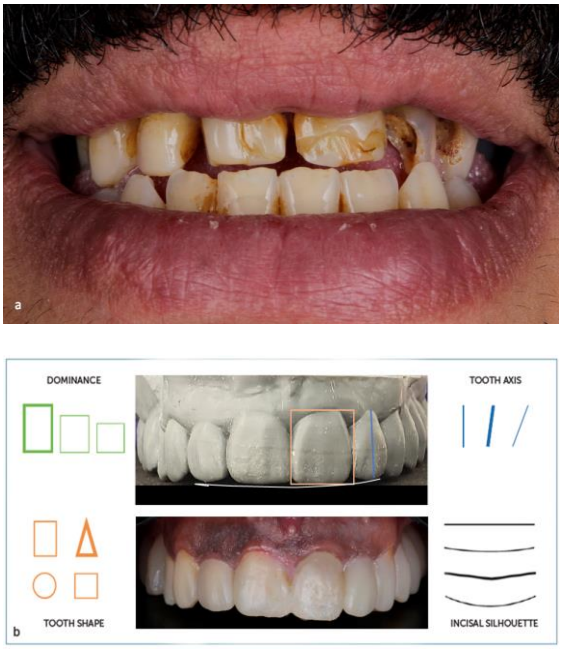

Figure. 13 a and b. The visualization of the APT in the mouth and its relation to the facial appearance. The software created this design. with medium dominant central incisors (green). Square tooth shapes (orange). Rounded incisal silhouette (white), and a vertical tooth axis (blue), are all based on the facial perception and personality of the patient. As can be seen in this illustration the software can create a smile design with many different combinations of the different shapes. lines. and line angles.

Tooth preparation through the Aesthetic Pre-evaluative Temporaries (APT)

The APT restoration was used as a precise guideline to prepare the tooth structure based on the planned final tooth contours. The tooth structure undergoes only the more conservative preparation or even no preparation in certain areas using depth cutter burs through the APT restoration according to the pre-established goals. The previous silicone index is also used to check the preparation depths (Figure. 14a and b).

Figure. 14. (a) the APT restoration. (b) Preparation depths are marked with a pencil.

Finalizing the Case

Once the teeth are prepared, the dentist can choose to continue the case digitally by creating an intraoral digital scan or continue in a conventional analog manner.
The patient is dismissed with the provisional restoration, the case is sent to the laboratory, and the veneers are produced. These veneers were then bonded on the patient's teeth [11]

Figure. 15. The final result: Monolithic IPS e.max porcelain laminate veneers (Ivoclar Vivadent) performed with a minor cutback technique are applied over the incisal edges. The smile flows with the facial appearance and the personality of the patient, who is extremely happy with the new smile design.

Conclusion

The combination of the basic rules of esthetics together with the reflection of the facial analysis and the personality of the patient in the smile design creates a more natural and personalized smile [10]
This principle presumes harmony between the smile design and the patient's personality. The new smile creates more natural and personalized smiles.

In conclusion, this clinical study highlights the advantages of combining traditional esthetic dentistry practices with modern digital technologies like REBEL for smile design.

The Rebel concept, which can be applied very easily and rapidly, can help the dentist or ceramist to achieve this goal in the most simplistic, practical, and personalized way. The authors' clinical experience shows a minimum of 80% success in the acceptance of the final smile design treatment. Finally, research is done, if the result of applying this technique does not satisfy the patient due to the subjectivity of the matter, the dentist can always make minor alterations to adopt this design according to the patient's desires.

References

1. Gurel, G. (2020). The Artificial Intelligence-Based 3D Smile Design: REBEL. In: Trushkowsky, R. (eds) Esthetic Oral Rehabilitation with Veneers. Springer, Cham. https://doi.org/10.1007/978-3-030-41091 9_9.
2. Iliev, G. "Personalized digital smile design for predictable aesthetic results." Balkan Journal of Dental Medicine 20.3 (2016): 172-177.
3. Paolucci B, Calamita M, Coachman C, Gurel G, Shayder A, Hallawell P. Visagism: The art of dental composition. Quintessence Dent Technol. 2012;35:187.
4. Sharma A, Luthra R, Kaur P. A photographic study on Visagism. Indian J Oral Sci 2015; 6:122-7.
5. Omar D, Duarte C. The application of parameters for comprehensive smile esthetics by digital smile design programs: A literature review. Saudi Dent. J. 2018; 30:7–12.
6. Trushkowsky, Richard D., ed. Esthetic oral rehabilitation with veneers: a guide to treatment preparation and clinical concepts. Springer Nature, 2020.
7. Sanketh, Archana K., et al. "Visagism: An Essential Concept in Esthetic Dentistry." RGUHS Journal of Dental Sciences 15.3 (2023).
8. Coachman, Christian, and Marcelo Calamita. "Digital smile design: a tool for treatment planning and communication in esthetic dentistry." Quintessence Dent Technol 35 (2012): 103-111.
9. Yankov, Boyan, et al. "Software application for smile design automation using the Visagism theory." Proceedings of the 17th International Conference on Computer Systems and Technologies 2016
10. Gürel, Galip, et al. "The fifth dimension in esthetic dentistry." The International Journal of Esthetic Dentistry 16.1 (2021): 10-32.
11. Pashley OH. Tay FR. Breschi L et al. State-of-the-art etch-and-rinse adhesives. Dent Master 2011; 27:1-16.