International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 7; Issue 2(D); February 2018; Page No. 9855-9860
DOI: http://dx.doi.org/10.24327/ijcar.2018.9860.1645

Research Article

EFFICACY OF UNANI FORMULATION IN *WARM-E-TAJAWEEF ANAF* MUZMIN (CHRONIC RHINOSINUSITIS)

Mohammad Irfan Ansari* and Muzafar Din Ahmad Bhat

Department of Moalajat, National Institute of Unani Medicine, Bengaluru, Karnataka, India

A R T I C L E I N F O

Article History:
Received 6th November, 2017
Received in revised form 21st December, 2017
Accepted 23rd January, 2018
Published online 28th February, 2018

Key words:
CRS, Unani formulation, SNOT-22, X-ray PNS.

A B S T R A C T

Background and objectives: Chronic rhinosinusitis (CRS) is a common inflammatory disease, affecting the quality of life of patients and representing an important burden for the society.The signs and symptoms of *Warm-e-Tajaweef Anaf Muzmin* are consistent with *Nazlabarid* in Unani system of medicine which depend on the involvement of paranasal sinuses. About 5-15% of the worldwide population is affected with chronic rhinosinusitis. The present study was designed to scientifically evaluate the efficacy of poly herbal Unani formulation in the management of *Warm-e-Tajaweef Anaf Muzmin* (Chronic Rhinosinusitis).

Methods: Pre and Post analysis interventional study without control was carried out on 29 patients after screening 87 patients. The test drug formulation contains *Gul-e-banafsha*, *Ustukhuddoos*, *Asl-us-soos* and Misri. Patients were advised to take it in the form of lukewarm decoction (*joshanda*) orally daily before meals twice a day for 30 days. All patients were assessed by subjective and objective parameters (VAS, SNOT-22 scores & X-ray PNS). The data was analysed statistically by paired proportion test and paired t test before and after treatment to assess the effect of intervention.

Results: The test drug formulation revealed statistically significant improvement in all subjective parameters ($p<0.001$). VAS and SNOT-22 scores also showed highly significant reduction in various symptoms and improvement in quality of life respectively with $p<0.001$. X-ray PNS revealed 44.8% improvement from baseline, which was statistically highly significant ($p< 0.001$).

Interpretation and conclusion: The study revealed that the test drug formulation is effective in the management of *Warm-e-Tajaweef Anaf Muzmin* without any side effects. Thus, it can be used as an alternate treatment it.

INTRODUCTION

The term sinusitis is replaced by rhinosinusitis because sinusitis is often preceded by rhinitis and rarely occurs without concurrent nasal airway inflammation. Thus, the rhinosinusitis refers to inflammation of the mucosal lining of nose and paranasal sinuses[1].

The term *Warm-e-Tajaweef Anaf* is not mentioned as such in Unani system of medicine. However, Unani scholars have described *Nazla* wa *Zukam* which are same as *Warm-e-Tajaweef Anaf* and categorised as *haad* and *muzmin* (Acute & Chronic). The signs and symptoms of *Warm-e-Tajaweef Anaf Muzmin* (Chronic rhinosinusitis) are consistent with *Nazla barid.* Most of the Unani scholars have considered *Nazla* and *Zukam* as a single entity and described that *madda* (morbid matter) drips down from brain in both these conditions.

Corresponding author:* **Mohammad Irfan Ansari
Department of Moalajat, National Institute of Unani Medicine, Bengaluru, Karnataka, India

But some Unani physicians mentioned *Nazla* as a condition where *madda* is dripping down towards the throat and chest, if same *madda* flows down towards the nose; it is referred as *Zukam*[2,3]. *Nazla barid* occurs as a result of the involvement of various factors which affects the individual either externally (*baroodat kharji*) or internally (*baroodat mizaji)* and sometimes both.The people with *barid mizaj* (cold temperament) are more prone to develop this disease as the *madda* in brain fails to yield complete *nuzj* and becomes unsuitable for utilisation, so the brain evacuates this *fazil madda* (morbid matter) down towards throat and chest[2,4].

The most frequently affected sinus is maxillary sinus whereas the sphenoidal sinus seldom becomes infected[5]. Sometimes, all the sinuses of one or both sides are involved simultaneously then it is termed as pansinusitis[6]. Chronic rhinosinusitis (CRS) is a common multifactorial inflammatory disorder of the upper airway system that drastically affects the patient's quality of life across all ages and socioeconomic conditions of millions of people worldwide. About 5-15% of the worldwide population is affected with chronic rhinosinusitis[7].

Rhinosinusitis is characterized as Acute (symptoms last less than 4 weeks), Subacute (symptoms last 4 to 8 or 12 weeks), Chronic (symptoms last longer than 8 weeks or ≥ 12 weeks) with or without acute exacerbation and Recurrent (≥ 3 or ≥ 4 acute episodes per year)[6,8].

The major clinical manifestations of chronic rhinosinusitis are nasal obstruction, nasal discharge, facial pain or pressure, facial heaviness, cough due to post nasal drip and impaired sense of smell. The facial pain and facial congestion depend on the involvement of sinus[6,9].

In general, the diagnosis of this disease is made through the combination of clinical criteria, imaging studies, and/or laboratory tests.

Rhinosinusitis is often very frustrating and difficult to treat, and medical "failures" often become surgical patients. Hence there is a strong need for more effective treatments[10]. After a thorough review it was concluded that the management of CRS requires the drugs having the properties like *Mulattif* (demulcent)*, Munzij, Mukhrij Balgham* (expectorant), *Muhallil* (resolvent), *Mulattif* (demulcent), *Mufatteh Sudad* (deobstruent) and antimicrobial activity (*Dafi'-i-ufunat*). For this purpose a Unani pharmacopial formulation from "*Beyaz-e-kabeer*" consisting of *Gul-e-banafsha* (Viola odorata), *Ustukhuddoos* (Lavandula stoechas), *Asl-us-soos* (Glycyrrhiza glabra)and Misri was given to the patients in the form of *Joshanda* (decoction)[11]. The efficacy of this formulation has been evaluated on the anvil of modern parameters and results drawn were found promising.

MATERIAL AND METHODS

Pre and Post analysis interventional study without controlwas conducted in the department of Moalajat, National Institute of Unani Medicine hospital, Bengaluru and approved by Institutional Ethical Committee NIUM, Bengaluru under IEC No: NIUM / IEC / 2014-15 / 007/ Moal / 07, dated 16/04/2015.This study was carried out between, April 2016 to March 2017 on 30 patients for the duration of 30 days.

Study participants

The patients were enrolled in the study after fulfilling the following criteria:

Inclusion criteria: 1) patient's age within the range of 18 to 60 years; 2) both the gender; 3)≥8weeks of persistent symptoms; 4)Meet ≥2 of 5major symptoms criteria[12](facial pain and pressure, facial congestion and fullness, nasal obstruction and congestion, nasal discharge, olfactory disturbances); 5) X-ray of PNS (Water's view) shows haziness/opacity and may show free fluid level[1,13].

Exclusion criteria:1) Pregnancy and Lactation patients; 2) known systemic and metabolic diseases; 3) Patients with the history of trauma and accidents; 4) Diagnosed cases of external injuries, nasal polyp, nasal growth and adenoids.

Study interventions

The study medications included *joshanda* (decoction) of *Gul-e-banafsha* (Viola odorata), *Ustukhuddoos* (Lavandula stoechas), *Asl-us-soos* (Glycyrrhiza glabra)in equal quantity (7gm in each) and Misri (25gm), provided by pharmacy of National Institute of Unani Medicine, Bengaluru.Before preparing the formulation, all the drugs were properly identified to ascertain their originality. The drugs were crushed, weighed and mixed in their respective proportions as described in Qarabadeen. These drugs were dispensed to the patient in a transparent plastic lock bag, to avoid any confusion regarding dosage. One lock bag was used to dispense 21gm of drug for single day. So every patient was given 15 packets of drugs for two weeks at each visit. The patients were advised to soak these drugs in 400 ml of water for whole night and next morning soaked drugs were allowed to boil till water reduces to half (200 ml). The decoction (*joshanda*) is filtered and misri 25g will be dissolved in it. Patients were advised to take 100 ml of lukewarm decoction (*joshanda*) orallydaily before meals twice a day for 30 days.

Study procedure

Patients fulfilling the inclusion criteria were enrolled in the clinical study. The patients were assessed clinically by the relevant history taking, general physical examination, local examination of nose and other required parameters. SES was assessed by Kuppaswamy's socioeconomic status scale modified for 2014. The *Mizaj* of the patient was determined on the assessment of *Ajnās-e-Ashra* (10 determinants) mentioned in classical Unani literature. All the information was recorded in the case record form designed for the study. After thorough evaluation of patients by history and clinical examination, patients were advised for necessary lab investigations and X-ray PNS (Water's view). If haziness/opacity or mucosal thickening or free fluid level in sinuses was detected in X-ray PNS of the patients, they were diagnosed as a case of *Warm-e-Tajaweef Anaf Muzmin* and enrolled in the study after obtaining a written voluntary informed consent.

The patients were followed every 15 days during the therapy. Improvements in the symptoms were assessed by change in the subjective (major symptoms) and objective parameters (VAS, SNOT-22 and X-ray of PNS). The patients were also asked for any adverse effects noted during the trial period. Pre and post treatment values of subjective and objective parameters were analysed and subjected to comparison statistically to evaluate the efficacy of the drug.

After completion of the trial on 30th day, the subjects were asked to report on 45th day for follow up to note any recurrence in the symptoms.

Outcomes

The primary outcome measures were assessed by change in VAS and SNOT-22 scores and secondary outcome by change in grading of X-ray findings at the end of 30 days from baseline.

The degree or strength of major symptoms was estimated using VAS which provides a subjective assessment of the symptoms. VAS ranging from 0 (nasal symptoms, not at all difficult) to 10 cm (nasal symptoms, extremely difficult) was used to assess the severity of combined nasal symptoms. VAS scoring is based on 'mild' as being 0- 3 inclusive, 'moderate' as >3- 7 inclusive and 'severe' as >7- 10 inclusive[14].

Quality of Life questionnaire (SNOT-22) containing 22 questions, divided into five subgroups (nasal symptoms, paranasal symptoms, sleep-related symptoms, and social and emotional impairment) rate individual items on a six point scale (0 - no problem, 5 - most serious problem) and in addition, patient mark which of the five items they consider to be the most important.

X-ray PNS (Water's view) was used to diagnose haziness/opacity or mucosal thickening or free fluid level of one or more sinuses, and assessed by grading before and after treatment as; GradeI= Normal, GradeII= Reduced translucency/haziness, GradeIII=Mucosal thickening and partial opacity, GradeIV= Complete opacity or free fluid level.

Safety evaluation

All the efficacy variables were assessed at every visit of follow-up. Any adverse reactions were observed throughout the course of study. Investigations (Haemogram, ESR, RBS, ALT, AST, Blood urea, Serum creatinine and X-ray of PNS (Water's view)were carried out in each case to exclude the patients with pathological conditions mentioned under exclusion criteria and to assess the safety of test drug.

Statistical analysis

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in number (%) from baseline to after treatment within group. Significance is assessed at 5 % level of significance. Student t test (two tailed, dependent) has been used to find the significance of study parameters on continuous scale within groups (Intragroup analysis). Paired Proportion test has been used to find the significance of proportion in paired data. Statistical analysis was performed using statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1[15,16,17,18].

RESULTS

In this study, a total of 87 patients were screened. Out of them 57 patients were excluded because they did not fulfilled the inclusion criteria, remaining 30 patients were enrolled. During the study, one patient lost follow-up, remaining 29 patients (19 males & 10 females) with mean age of 35.79±10.91 completed the course of treatment. Statistical analysis was done on these 29 patients who completed the course of treatment. The flow diagram of the study is shown in Figure No. 01.

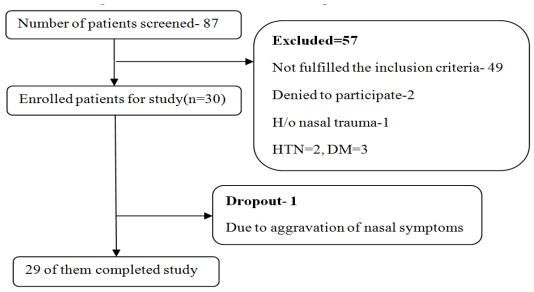

Fig No.1 The CONSORT flow diagram

The demographic characteristics of participants are shown in Table No.01. The effect of test drug formulation on various subjective parameters such as nasal obstruction, nasal discharge, facial pain & pressure, facial congestion or fullness and olfactory disturbance (Smell) were assessed at baseline (BT), 15th (F1), 30th (F2) and 45th (F3) days, and evaluated on the basis of arbitrary grading score scale as shown in Table No. 02**.** Mean VAS score and SNOT-22 score at baseline and after treatment are shown in Table No. 03.In intragroup comparison using paired't' test, findings were statistically highly significant (p< 0.001), it indicates that symptoms showed significant reduction on VAS and SNOT-22 score.

Table No. 1 Demographic data

Age in years	No. (%)	Occupation	No. (%)
<20	1 (3.4)	Housewife	8 (27.6)
20-30	9 (31.0)	Employee	8 (27.6)
31-40	11 (37.9)	Businessmen	6 (20.7)
41-50	4 (13.8)	Labour	4 (13.8)
51-60	4 (13.8)	Student	3 (10.3)
Total	29 (100)	Total	29 (100)
Mean±SD	35.79±10.91		
Gender	**No. (%)**	**Religion**	**No. (%)**
Male	19 (65.5)	Muslim	19 (65.5)
Female	10 (34.5)	Hindu	10 (34.5)
Total	29 (100)	Total	29 (100)
Marital status	**No. (%)**	***Mizaj***	**No. (%)**
Married	22 (75.9)	Balghami	21 (72.4)
Unmarried	7 (24.1)	Damwi	8 (27.6)
Total	29 (100)	Total	29 (100)
SES	**No. (%)**	**Sinus involvement**	**No. (%)**
I	1 (3.4)	Maxillary	18 (62.1)
II	4 (13.8)	Frontal	5 (17.2)
III	11 (37.9)	Maxillary+Frontal	4 (13.8)
IV	13 (44.8)	Maxillary+Ethmoid	2 (6.9)
Total	29 (100)	Total	29 (100)
Allergen	**No. (%)**	**Duration of illness (Years)**	**No. (%)**
Cold+Dust	10 (34.5)	≤1	7 (24.1)
Cold+Dust+Smoke	6 (20.7)	1.1-2	4 (13.8)
Cold+Dust+Smoke+Perfume	4 (13.8)	2.1-5	8 (27.6)
Cold	4 (13.8)	5.1-10	7 (24.1)
Dust	1 (3.4)	>10	3 (10.3)
Dust+Smoke	1 (3.4)		
Cold+Dust+Perfume	1 (3.4)		
Dust+Smoke+Perfume	1 (3.4)	Total	29 (100)
Absent	1 (3.4)		
Total	29 (100)		

Table No 2 Pre and Post assessment in Subjective parameters

Subjective parameters (Symptoms)	No. of patients	Mean (Paired t-test)		P-value	Improvements (Paired proportion test)	P-value
		BT	F2 (AT)			
Nasal obstruction/congestion	29 (93.1%)	3.38±1.15	0.97±0.73	p< 0.001	86.2%	p< 0.001
Nasal discharge	28(96.6%)	3.38±1.08	1.28±1.03	p<0.001	75.9%	p< 0.001
Facial congestion / fullness	28 (96.6%)	3.21±0.98	0.83±0.80	p<0.001	75.9%	p< 0.001
Pain and pressure in affected region	22 (75.9%)	2.52±1.55	0.62±0.82	p< 0.001	65.5%	p< 0.001
Olfactory disturbance (Smell)	12 (41.4%)	1.24±1.60	0.90±1.35	p= 0.004	13.8%	p =0.259

Table No. 3 VAS & SNOT-22: Pre and Post assessment

Objective parameters	Mean (Paired t-test)		
	BT	F2 (AT)	F3
Visual analogue scale (VAS) score	7.90±0.94	2.41±1.24	2.62±1.61
P-value		p< 0.001	p< 0.001
Sino-nasal outcome test (SNOT-22) score	43.21±9.21	14.90±7.66	15.31±8.65
P-value		p< 0.001	p< 0.001

The improvement in quality of life (QoL) for the patients is a critical indicator of success rate of the treatment. SNOT-22 became one of the widely used instruments for measuring the QoL.

The changes in X- ray findings are given in Table No. 04**.**Resultshows44.8% improvement from the baseline, which was statistically highly significant (p< 0.001) using paired proportion test.

Efficacy outcome

Efficacy assessment was done on the basis of primary and secondary outcome.

Table No 4 X-ray PNS grading: Pre and Post assessment

Radiological Assessment (Grading)	BT	F2 (AT)	% change	P-value
Grade I	0(0%)	13(44.8%)	44.8%	
Grade II	26(89.7%)	15(51.7%)	-38.0%	p<
Grade III	3(10.3%)	1(3.4%)	-6.9%	0.001
Total	29(100%)	29(100%)	-	

Primary outcome

Test drug formulationwas effective in improving the overall severity of symptoms and quality of life in patients of *Warm-e-Tajaweef Anaf Muzmin* (ChronicRhinosinusitis), assessed by using VAS and SNOT-22 scores respectively ($p<0.001$).

Secondary outcome

Test drug formulationwas effective in changing X-ray of PNS findings, analyzed statistically using paired proportion test ($p<0.001$).

DISCUSSION

This study showed that patients with chronic rhinosinusitis receiving *joshanda* (decoction) of Unani formulation which consist of *Gul-e-banafsha* (Viola *odorata*), *Ustukhuddoos* (Lavandula stoechas), *Asl-us-soos* (Glycyrrhiza *glabra*) experienced significant benefits after 30 days of treatment. The clinical relevance of these findings was assessed by improvements seen in both subjective parameterson arbitrary scale and objective parameters.

CRS is the most common in younger age in this study which isconsistent with studies conducted by Bachert *et al*.[19], Anwar K *et al*.[20] and Rao K.[21]Most of the patients were found allergic to cold, dust, smoke and perfume. Gao *et al*. stated that occupational and environmental allergens like cold, dust, smoke and gases play an important role in development of chronic rhinosinusitis as a predisposing factor[22].Inthe present studythe highest prevalence of chronic rhinosinusitis was observed in patients with *Balghami mizaj* followed by *Damwī mizaj* as assessed by temperament scale. In Unani system of medicine, it is mentioned that most of the patients of *Nazla barid* are having *Barid mizaj*[2,3,4].The incidence was more in patients who had *Balghamī mizaj (Barid mizaj)*, which is in concordance with the study conducted by Dar KA etal.[23] Maximum number of patients were having maxillary sinusitis followed by frontal sinusitis. Studies have reported that maxillary sinus is more affected as compared to other sinuses. This study is in concordance with the study carried out by Dar KA *et al*.[23]and Afolabi *et al*.[24]

The effect of test drug formulation on various subjective parameters such as nasal obstruction, nasal discharge, facial pain & pressure, facial congestion or fullness and olfactory disturbance (Smell) were assessed at baseline, 15th, 30th and 45th days, and evaluated on the basis of arbitrary grading score scale.Our study revealed that the most common reported symptoms in CRS were nasal discharge and facial congestion in 28 (96.6%) patients, followed by nasal congestion/obstruction in 27 (93.1%) patients.The occurrence of these symptoms observed in our study is consistent with Panigrahi HK[25] and Afolabi *et al*[24].

The improvement in nasal congestion might be due to *mulattif* (demulcent) action of *Banafsha*, *Asl-us-soos*[26]&*Ustukhuddoos*[26,27], *muhallil* (resolvent) action of *Banafsha*[26,27]&*Ustukhuddoos*[26,27] and *mufatteh sudad* (deobstruent) action of *Ustukhuddoos*[26,27]. Some studies have shown that *Asl-us-soos* has anti-inflammatory and demulcent activity which could explain relief in nasal obstruction[28]. The improvement in nasal discharge might be due to *muhallil* (resolvent) action of *Banafsha*[26,27] & *Ustukhuddoos*[26,27] and may also be due to anti-allergic activity of *Asl-us-soos*[29].

The improvement in facial congestion/fullness might be due to *mulattif* (demulcent) action of *Banafsha*, *Asl-us-soos*[26]&*Ustukhuddoos*[26,27], *muhallil* (resolvent) action of *Banafsha*[26,27]&*Ustukhuddoos*[26,27], *munaffis-e-balgham* (expectorant) action of *Asl-us-soos*[26] and *mushil-e-balgham*&*munaqqi-e-dimagh* action of *Ustukhuddoos*[26,30]. Salicylic acid present in Viola *odorata*[31] and Glycyrrhizin present in Glycyrrhiza *glabra*[32] have anti-inflammatory action which could explain relief in facial congestion/fullness[28].

The improvement in facial pain & pressure might be due to *muhallil* (resolvent) action of *Banafsha*[26,27] & *Ustukhuddoos*[26,27] and *munawwim* (sedative) & *daf-e-suda'a* action of *Banafsha*[26]. Also, the salicylic acid component of *Banafsha*[31] and Glycyrrhizin component of *Asl-us-soos* has been reported to possess anti-inflammatory activity[32] which could explain the relief of facial pain & pressure.

The improvement in impaired sense of smell might be due to *mulattif* (demulcent) action of *Banafsha*, *Asl-us-soos*[26]&*Ustukhuddoos*[26,27], *muhallil* (resolvent) action of *Banafsha*[26,27]&*Ustukhuddoos*[26,27]. The olfactory disturbance is mostly caused to nasal obstruction. Some studies have shown that *Asl-us-soos* has anti-inflammatory and demulcent activity which could explain relief in impaired sense of smell[28].

VAS and SNOT-22 score were assessed at baseline, 15th, 30th and 45th days whereas X-ray PNS grading (Water's view) was assessed at baseline and after treatment (30th day).

VAS score of symptoms severity and SNOT-22 score were reduced significantly at end of trial from baseline.The improvement in quality of life (QoL) for the patients is a critical indicator of success rate of the treatment. SNOT-22 became one of the widely used instruments for measuring the QoL. Our study showed that use of this trial formulation in management of chronic rhinosinusitis can also improve the patients' quality of life.

This study revealed that this Unani formulation is effective in recovery of changes in X-ray PNS (Water's view). Haziness/Opacity in the sinus is produced by the accumulation of mucous and abnormal inflammatory fluid. This change in X-ray might be due *mulattif* (demulcent) action of *Banafsha*, *Asl-us-soos*[26]&*Ustukhuddoos*[26,27], *muhallil* (resolvent) action of *Banafsha*[26,27]&*Ustukhuddoos*[26,27], *munaffis-e-balgham* (expectorant) action of *Asl-us-soos*[26] and *mushil-e-balgham*&*munaqqi-e-dimagh* action of *Ustukhuddoos*[26,30].

The overall improvement in the *Warm-e-Tajaweef Anaf Muzmin* (ChronicRhinosinusitis) revealed in the form of regression of various symptoms, improvement of quality of life and recovery of the changes of X-ray PNS may be due to the *Tadeel-e-mizaj* and different pharmacological actions of the drugs like *Mulattif* (demulcent), *Muhallil* (resolvent), *Mufatteh sudad (deobstruent)*, *Munaffis-e-balgham* (expectorant), *Mushil-e-balgham*, *Munaqqi-e-dimagh* and *Munawwim* of various ingredients of Unani formulation which contains *Banafsha*, *Asl-us-soos* and *Ustukhuddoos*. Various experimental studies have shown that *Banafsha* has

antibacterial[33], sedative[34]& laxative activity[35], *Asl-us-soos* possess expectorant, antibacterial[36], anti-inflammatory[32], immunomodulator[37]& antifungal activity[38] and *Ustukhuddoos* possess antibacterial[39], antifungal[40], & expectorant activity. These activities help in the regression of symptoms and recovery of the changes of X-ray PNS.

All the safety parameters were within normal limits. Therefore the test drug formulation can be used safely at the prescribed therapeutic dose.

CONCLUSION

Results of the present study demonstrated that test drug formulation in the present study is safe and effective in the management of *Warm-e-Tajaweef Anaf Muzmin* (ChronicRhinosinusitis) and conventional medicine or surgical intervention should no longer be the only treatment option to the patients. Further studies are imperative to confirm these results. Moreover studies on efficacy of different doses and treatment duration of test drug formulation are required to fine-tune these observations.

Abbreviations

CRS=Chronic rhinosinusitis, VAS=Visual analogue scale, SNOT-22=Sino-nasal outcome test, PNS=Paranasal sinus, GM= Gram, SES= Socioeconomic status, ESR=Erythrocyte sedimentation rate, RBS=Random blood sugar, ALT=Alanine aminotransferase, AST=Aspartate aminotransferase, SD=Standard deviation, HTN=Hypertension, DM=Diabetes mellitus, QoL=Quality of life

Conflicts of interest

The authors declare no conflicts of interest.

Acknowledgements

Our special thanks go to the colleagues and the staff of National institute of Unani medicine, Bangalore. Our special thanks go to all those authors whose scientific papers and books are cited for reference in this work.

References

1. Benninger SM.2003. Adult chronic rhinosinusitis: Definitions, Diagnosis, Epidemiology, and Pathophysiology. Otolaryngology-Head and Neck Surgery. 129 (3): S1-S32.
2. Sina I. 2010. Al-qanoon Fi'l Tib Vol. III, Part I (Urdu Translation by Kantoori GH). New Delhi: Idara Kitab-us-Shifa. 660-63.
3. Jurjani AH. 2010. Zakhira Khuazam Shahi Vol. VI (Urdu Transalation by Khan HH). New Delhi: Idara Kitab-us-Shifa. 201-05.
4. Khan MA. 2010. Akseer-e-Aazam (Urdu Translation by Kabeeruddin HM). New Delhi: Ijaz Publishing house. 210-19.
5. Fauci AS, Braunwald E, Kasper DL, Hauser SL, Longo DL, Jameson JL *et al*. 2012. Harrison's Principles of Internal Medicine 18th ed. Vol. I. McGraw-Hill Companies, Inc. 256-58.
6. Maqbool M, Maqbool S. 2013. Text book of Ear, Nose, and Throat Diseases 12th ed. New Delhi: Jaypee Brothes Medical Publishers (P) LTD. 154-164.
7. Jangala M, Koralla RM, Manche SK, Akka J. 2016 July. Microbial Prevalence and Antimicrobial Resistance in Children and Adolescents with Chronic Rhinosinusitis in South Indian Population. Otolaryngol (Sunnyvale). 6 (4).
8. Leung RS, Katial R. 2008.The Diagnosis and Management of Acute and Chronic Sinusitis. Elsevier Saunders: *Primary Care Clinic in Office Pract*. 35: 11-24.
9. Murray JF, Nadel JA, Mason RJ, Broaddus VC, Martin TR, King TE *et al*. 2010. Textbook of Respiratory Medicine 5th ed. Vol. I, Saunders Elsevier. 1052-57.
10. Hamilos DL. 2000. Chronic sinusitis. *J Allergy Clin Immunol*. 106 (2): 213-27.
11. Kabeeruddin HM. 2010.Beyaz-e-Kabeer Part-I. New Delhi: Idara Kitab-us-Shifa. 15.
12. Kaplan A. 2013.Canadian guidelines for chronic rhinosinusitis. *Canadian Family Physician*. 59: 1275-81.
13. Pandey A, Nigam R, Jain AK. 2014.A Comparative Study of Radiological and Endoscopic Findings in Paranasal Sinus Disease. *Scholars Journal of Applied Medical Sciences* (SJAMS). 2(3C): 1053-1058.
14. Lim M, Lew-Gor S, Darby Y, Brookes N, Scadding G, *et al*. 2007. The relationship between subjective assessment instruments in chronic rhinosinusitis. *Rhinology*. 45: 144-147.
15. Rosner B. 2000. Fundamentals of Biostatistics 5th ed. Duxbury. 80-240.
16. Riffenburg RH. 2005. Statistics in Medicine 2nd ed. Academic press. 85-125.
17. Rao SP, Richard J. 2006. An Introduction to Biostatistics, A manual for students in health sciences. 4th ed. New Delhi: Prentice hall of India. 86-160.
18. Suresh KP, Chandrasekhar S. 2012.Sample Size estimation and Power analysis for Clinical research studies. *Journal Human Reproduction Science*. 5(1): 7-13.
19. Bachert C, Schapowal A, Funk P, Kieser M. 2009.Treatment of acute rhinosinusitis with the preparation from Pelargonium sidoides EPs 7630: A randomized, double-blind, placebo-controlled trial. Rhinology. 47: 51-58.
20. Anwar K, Din G, Zada B, Khan IA. 2011. Sinus radiography: is water's view helpful in the management of chronic maxillary sinusitis. *Gomal Journal of Medical Sciences*. 9 (1): 11-14.
21. Rao K. 2016. Computed tomography of paranasal sinus pathologies with functional endoscopic sinus surgery/nasal endoscopy correlation. *Clinical Rhinology: An International Journal*. 9 (1): 1-5.
22. Gao WX, QuanOu C, Fang SB, SunYQ, Zhang H, *et al*. 2016.Occupational and environmental risk factors for chronic rhinosinusitis in China: A multicentre cross-sectional study. *Respiratory Research*. 17 (54): 1-7.
23. Dar AK, Lone AH. 2013Demographic Study of Sinusitis in Patients Visiting Govt. Unani Hospital Srinagar and Ayush Centres in Kashmir. *Medical Journal of Islamic World Academy of Sciences*. 21 (3): 115-118.
24. Afolabi OA, Alabi BA, Omokanye HK, Ayodele SO, Segun-Busari S, *et al*. 2016. Management and Outcome of Rhinosinusitis in Nigeria. *American Academy of Otolaryngology-Head and Neck Surgery*. 1-7.

25. Panigrahi HK. 2006. Efficacy of Ayurvedic Medicine in the Treatment of Uncomplicated Chronic Sinusitis. Ancient Science of Life. 26 (1 & 2): 6-11.
26. Ghani N. YNM. Khazain-ul-Advia. New Delhi: Idara Kitab-us-Shifa. 226-27, 397-98, 1260-61.
27. Hakeem MA. 2002. Bustan-ul-Mufradat. New Delhi: Idara Kitab-us-Shifa. 67-69, 138-39, 556.
28. Harwansh RK, Patra1 KC, Pareta SK, Singh J, Biswas R. 2011.Pharmacological studies on Glycyrrhiza glabra: A review. *Pharmacologyonline*. 2: 1032-1038.
29. Khare CP. 2007. Indian Medicinal Plants 1st ed. New Delhi: Springer (India) Private Limited. 289-90, 365-66, 706.
30. Ibn Al Baitar. 1999. Aljam-ul-Mufradat Al advia wal Aghziyah (Urdu Translation) Vol.-I. New Delhi: CCRUM. 54-56, 287-89.
31. Salve T, Rathod V, Tike SK, Kadam R, Khade R. 2014. A review article on Banafsha (Viola odarata linn.). *Punarnav Ayurved Journal*. 2 (4): 01-08.
32. Nirmala P, Selvaraj T. 2011.Anti-inflammatory and anti-bacterial activities of Glycyrrhiza glabra L. *Journal of Agricultural Technology*. 7(3): 815-823.
33. Gautam SS, Navneet, Kumar S.2012. The Antibacterial and Phytochemical Aspects of Viola odorata Linn. Extracts Against Respiratory Tract Pathogen. The National Academy of Sciences, India. 82 (4): 567–572.
34. Monadi A, Rezaie A. 2013. Evaluation of Sedative and Pre-Anesthetic Effects of Viola odorata Linn. Extract Compared With Diazepam in Rats. *Bulletin of Environment, Pharmacology and Life Sciences*. 2 (7): 125-131.
35. Vishala A, Parveena K, Poojab S, Kannappanc N, Kumar S. 2009.Diuretic, Laxative and Toxicity Studies of Viola odorata Aerial Parts. *Pharmacologyonline*. 1: 739-748.
36. Karahan F, Avsar C, Ozyigit II, Berber I. 2016. Antimicrobial and antioxidant activities of medicinal plant Glycyrrhiza glabra var. glandulifera from different habitats. *Biotechnology & Biotechnological Equipment*. 30 (4): 797-804.
37. Mazumder PM, Pattnayak S, Parvani H, Sasmal D, Rathinavelusamy P. 2012. Evaluation of immunomodulatory activity of Glycyrhiza glabra L. roots in combination with zing. *Asian Pacific Journal of Tropical Biomedicine.* S15-S20.
38. Mahmoudabadi AZ, Iravani M, Khazrei A. 2009. Anti-fungal activity of Glycyrrhiza glabra (Licorice) against vaginal isolates of Candida. *Biotechnology an Indian Journal.* 3 (2): 75-77.
39. Alami Y, Naiba K, Ouhssine M, Chaouech M. 2015. Chemical Composition and Antibacterial Activity of Essential Oils of Lavandula Stoechas. *International Journal of Engineering Research & Technology (IJERT).* 4 (02): 1011-1014.
40. Baptista R, Madureira AM, Jorge R, Adão R, Duarte A, *et al*. 2015. Antioxidant and Antimycotic Activities of Two Native Lavandula Species from Portugal. Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine. 01-10

How to cite this article:

Mohammad Irfan Ansari and Muzafar Din Ahmad Bhat (2018) 'Efficacy of Unani Formulation in Warm-E-Tajaweef Anaf Muzmin (Chronic Rhinosinusitis) ', *International Journal of Current Advanced Research,* 07(2), pp. 9855-9860.
DOI: http://dx.doi.org/10.24327/ijcar.2018.9860.1645

****