Review Article

www.ijrap.net

ANCIENT THOUGHTS OF NEURO-VASCULAR INJURIES OF NECK IN THE PRE VIEW OF MARMA (VITAL POINTS): A REVIEW

Kulkarni BG [1]*, Kanthi GM [2]

[1]PhD scholar, Post Graduate Department of Shareera Rachana, SDM College of Ayurveda and Hospital, Kuthapady, Udupi, Karnataka State, India

[2]Retire professor, Post Graduate Department of Shareera Rachana, SDM College of Ayurveda and Hospital, Kuthapady, Udupi, Karnataka State, India

Received on: 24/03/16 Revised on: 12/04/16 Accepted on: 03/05/16

***Corresponding author**
E-mail: drbgkulkarni@gmail.com

DOI: 10.7897/2277-4343.073101

ABSTRACT

The concept of marma (vital point) in the Ayurveda is pioneer of science of traumatology, which has explored the vulnerable areas of human body. Neck is designated as most vital region of body because it encompasses many Neuro-vascular, muscular and visceral structures. There are three marma in neck as Matruka, Neela Manya and Krukatika. In neuro-vascular injuries of neck, mainly Matruka, and Neela Manya vessels are involved. Matruka vessels give rise to sudden death or death within seven days where as Neela Manya vessels manifests loss of taste, speech and abnormal voice. Their area of location is within four Angulai.e. 8 cm circumference. Even the contemporary medical science also specifies the neck as most complex region and injuries of neck as a challenge. Up to 30 % of the injuries involve multiple structures in the neck. Even though the percentage of mortality is decreased because of sophisticated technology but risk of morbidity and mortality has not completely abolished. The Ancient clinical observations on neuro-vascular injuries of neck are substantiated by reviewing the recent clinical data, which helps to understand the location, underlying structures of these Marma (Vitalpoints) and prove the relevancy of these observations.

KEY WORDS: Marma, Matruka Sira, Neela Manya, neuro-vascular injuries, carotid artery, laryngeal nerve, lingual artery, hypoglossal nerve

INTRODUCTION

Neck is imperative part of human body.Many Neuro-vascular, muscular and visceral structures are passing through the neck therefore it is designated as very vulnerable in terms of life. Therefore, Charaka treated it as Pranayatana[1] which means seat of life as well as Sushruta designated as Marma Sthana (vital point), which means on injury it give rise to death. Management of penetrating neck injuries is complicated by the anatomic high-density relationship between vascular, upper respiratory, digestive and neurological structures. Up to 30 % of the injuries involve multiple structures[2]. Expeditious systematic assessment, decision-making and appropriate treatment is required to minimize catastrophic complications.Ayurvedic anatomy of neck has different views. It states that there are three important marma as Matruka, Neela Manya and Krukatika[3], having particular dimension and injury of which leads to sudden death or death within one week or it may give rise to clinical deformities like difficulty in speech, loss of voice[3], impaired taste and instability of head. Matruka and Neela Manya are exhibiting the neuro-vascular ailments. So there is need to understand the structures, which are responsible for manifestations and their relevancy.

Concept of Marma

Acharya Sushruta has described 107 Marma in per view of traumatology. Marma (vital point) is the seat of Praan (life) and is constituted by confluence of Mamsa (muscle), Sira (vessel), Snayu (ligament), Asthi (bone) and Sandhi (joint)[4]. However, in each Marma there is a dominancy of one of the above elements. Depending up on the involvement of that structure, the clinical symptoms are exhibited. The doctrine of surgery even today encircles round these five Marma Vastu (vital elements). The art of healing without residual loss rests on these five tissues only.[5] Each vital point is having its own basic structure (Rachana), location (Sthan), size (Pramaan) and post traumatic effect (Parinaam).

Classical review

There are three Marma namely Krukatika, Matruka, Neela Manya located in the region of neck. These vital points are classified as follows.

Marma name	Location	Rachana	Parinaam	Pramaan
Matruka	On either side of Griva (Neck)	Sira Marma	Sadyopraanahara	4 Angula
Neela Manya	On either side of Kantha Naadi	Sira Marma	Vaikalyakara	4 Angula
Krukatika	At the junction of Shiras (head) and Greeva (Neck) on either side	Sandhi Marma	Vaikalyakara	1/2Angula

On injury of these, above three vital points exhibit various manifestations. Neela Manya Marma give rise to Mukata (loss of speech), Swara Vaikrutata (abnormal voice), Arasagrahita (loss of taste), where as Matruka Marma gives rise to Sadhyo Maran **(**instant death**)** or death within seven days and Krukatika Marma results Chalamurdhata (loss of stability of head) on injury. However, neuro-vascular injury point of view Matruka and Neela Manya marma are very vulnerable.The above posttraumatic effects are grave as there is a possibility of instant death or irreversible deformity, which may change the quality of life[6].

Anatomical Review

Neck anatomy is very complex as there are many vital structures passing through a very small place. Therefore, injuries of this region are notorious for diagnosis and treatment. Majority injury needs an intervention. Because of lack of bony shielding and close association of respiratory and digestivetract, spinal cord and major vessels, it requires a focus in terms of surgical management.

Neck contains major arteries and veins on each side of it. They are the subclavian arteries, veins, vertebral arteries that are highly developed vascular supply to the head and neck, carotid artery divides into its two terminal branches; the external and internal carotid arteries.At the bifurcation, the common carotid artery and the beginning of the internal carotid artery are dilated. This dilation is the carotid sinus and contains receptors that monitor changes in blood pressure and are innervated by a branch of the glossopharyngeal nerve. Another accumulation of receptors in the area of the bifurcation is responsible for detecting changes in blood chemistry, primarily oxygen content. This is the carotid body and is innervated by branches from both the glossopharyngeal and vagus nerves.[7]

The internal carotid arteries supply the cerebral hemispheres, the eyes and the contents of the orbits, and the forehead. External, Internal Jugular, anterior jugular are the important veins draining the face head and neck.It carries lot of attention of clinicians as it contains many nerves and glands e.g. cervical and upper thoracic part of spinal cord, vagus nerve (superior laryngeal nerve, external and internal laryngeal nerve), phrenic nerves, cervical part of sympathetic trunks (right and left) ,cervical ganglion, glossopharyngeal, hypoglossal nerve, lingual nerve, recurrent laryngeal nerves, brachial plexus and cervical plexus etc and thyroid, Parathyroid, part of Thymus, Submandibular gland.[7]

Zones of neck for categorization of injuries

The neck is divided into three anatomic zones. This helps in the categorization and management of neck wounds.
Zone I extends from the bottom of the cricoid cartilage to the clavicles and thoracic outlet. Within this zone lie the trachea, the great vessels, the esophagus, the upper mediastinum, the lung apices and the thoracic duct. Mortality in this zone is the highest of the three zones.
Zone II includes the area between the cricoid cartilage and the angle of the mandible. Enclosed within its region are the carotid and vertebral arteries, jugular veins, pharynx, larynx, esophagus, and trachea.
Zone III involves the area above the angle of the mandible up to the base of the skull, and includes the distal extra cranial carotid and vertebral arteries as well as segments of the jugular veins. Injuries in Zone II are readily evaluated and easily exposed operatively. Adequate exposure of Zone I or Zone III injuries can be difficult, thus, the diagnostic work-up may be more extensive than for Zone II injuries. Trauma to the neck is not necessarily limited to a specific zone. The neck is also anatomically divided into the anterior and the posterior triangles. Most of injuries involve Zone II in many studies, yet mortality is the highest in ZoneI.[8]

Review on clinical attributes

Carotid sinus reflex death- It is a potential etiology of sudden death in which manual stimulation of the carotid sinus allegedly causes strong glossopharyngeal nerve (Vagus nerve is for aortic arch baroreceptors) impulses leading to terminal cardiac arrest. Carotid sinus reflex death has been pointed out as a possible cause of death in cases of strangulation, hanging and autoerotic strangulation. Studies have also suggested that the carotid sinus reflex can be a contributing factor in other mechanisms of death by reducing blood pressure and heart rate, especially in the elderly or in people suffering from carotid sinus hypersensitivity. A carotid massage can also possibly dislodge a thrombus, or some plaque. This could lead to any number of life-threatening effects, including stroke[9].

Nerves injury - During operation on the thyroid gland, superior and inferior thyroid artery ligation is to avoid injury to external and recurrent laryngeal nerve respectively. Pressure on one of the nerves related to the thyroidarteries resulting change in the voice usually indicates a malignant growth of the thyroid gland.When the recurrent laryngeal nerve is cut accidentally on one side during partial thyroidectomy operation, the patient develops fixed rimaglottidis in paramedian position due to the action of the crico-thyroid muscle;the sound half of rima moves freely and even crosses the middle line to meet the opposite vocal fold. The voice become hoarse, but the patient does not complain any difficulty of respiration.[10] In children, the tracheostomy is risky owing to the shortness of the neck. Sometimes the brachiocephalic arterial trunk and left brachiocephalic vein extend above the supra-sternal notch in the children, these structures may be injured with the alarming hemorrhage.[10]

Neck Injuries- Superficial veins of neck lie between platysma and investing layer of deep fascia. Incision of neck bleeds freely until the deep fascia cut. This is due to fact that the retraction of divided platysma keeps the cut veins open and they are unable to collapse because of their attachment to the underlying fascia.[11]

Carotid artery injuries- Caused by blunt trauma often result in thrombosis and delayed neurologic deficits**.** In 85**%** of reported cases the extracranial internal carotid artery **(**ICA**)** or carotid bifurcation is involved, and an intimal tear or mural contusion is thought to be the underlying cause of thrombotic occlusion**.**[12]

Jugular venous aneurysm- may lead to thrombus formation due to stagnant and low-pressure flow within the neck veins. There is also the risk of rupture of aneurysm by trauma to the neck, though arterial aneurysms are more prone to rupture. Surgical excision is the treatment of choice in the management of venous aneurysm of the neck for the fear of risk of thrombosis, possible fear of rupture, and for cosmetic and esthetical reasons.[13]

Strangulation injuries-In the mechanisms of Strangulation there will be venous obstruction, leading to cerebral stagnation, hypoxia, and unconsciousness, which in turn, produces loss of muscle tone and final arterial and airway obstruction. Arterial spasm due to carotid pressure, leading to low cerebral blood flow and collapse.Vagal collapse, caused by pressure to the carotid.

DISCUSSION

Neela Manya Marma-The word Neela denotes blue color where as the term Manya indicates the back of the neck. According to classical description, it is situated on either side of Kanthanaadi. Here Kanthanaadi is correlated to larynx and trachea. These Marma are belong to Sira (vascular entity) category and Vaikalyakara in Parinaam, causing Mukata (loss of speech), swaravaikrutata (abnormal voice), Arasagrahita (loss of taste). Vagbhata has located this Marma near Mandibular region. The above Aghaat Parinaam are indicating the deranged function of tongue, larynx, pharynx and soft palate as these are involved in the function of perceiving taste and production of speech or voice. The deformity in the function may be due to lack of blood or nerve supply to these organs. The traumatic effect indicating the involvement of nervous tissue but it belongs to vascular category. This can be understood by the anatomical attributes of submandibular region.

The internal jugular vein is draining the tongue and larynx by its tributaries. The lingual and superior thyroidare important arteries supplying to tongue and larynx respectively. The taste sensation from the oral surface of soft palate and posterior one third of tongue are conveyed by the glossopharyngeal nerves. The motor supply to the tongue is given by accessory nerve, lingual nerve and sympathetic nerves, which surround the lingual artery.There is very close relation of 2nd part of lingual artery with hypoglossal nerve.During dissection of submandibular region, these are exposed.[14]

Any injury or thrombosis of lingual artery hampers the function of tongue. One should think it unexpected to see infarction of the tongue considering the tongue being such vascularized tissue, and primarily receiving its blood supply from the lingual artery of the external carotid artery. However, these arteries are infact terminal branches with rather minimal anastomosis across the midline of the tongue[15]

Kagami et. al. reported a case of a 62-year old man, with a history of ischemic coronary disease, developed acute pain, pallor, swelling and ulceration of the tongue. Angiography showed occlusion of the right external carotid, facial and lingual artery. The patient was treated with revascularization of the external carotid artery[16].This explanation highlights the significance of lingual artery. By above discussion it is revealed that the submandibular region is very vulnerable in neuro-vascular supply to tongue, soft palate point of view.

If the wounds of the vessels are in the upper part of the neck, hematoma is found near the angle of the mandible, this produce pressure on the certain structures to a concomitant nervous lesion. Therefore, a low hematoma may be associated with a phonic or hoarseness of voice due to lesion in the recurrent laryngeal nerve, and high hematoma may be associated with dysphasia due to compression on the vocal aperture[17]. The hematoma in the submandibular region producing aphonia or hoarseness of voice (Mukata, Vikruta Swara) is indicating the site of this Marma.

Even this also revealed in the complications of thyroid gland operations where recurrent laryngeal nerves, external laryngeal nerve may be interrupted.The incidence of Injuries to the recurrent laryngeal nerve has been reported between 1% to 2% from different thyroid surgery centers performed by experienced neck surgeons. By considering the vitality of this region, the Sthan (location) of this Marma can be determined on lateral aspect of neck, below the mandible. Because of presence of glossopharyngeal nerve, the close association of lingual artery with hypoglossal nerve, superior thyroid artery with superior laryngeal nerve and inferior thyroid artery with recurrent laryngeal nerve Sushruta might have included this marma under Sira category. These neuro-vascular structures only responsible for classical traumatic effect.

Matruka Marma –the meaning of word Matruka is indicating maternal quality. In other words, the Sira (Vessels)mentioned in the area of this Marma very significant in terms of nourishment. In the classics the term Greeva and Gala are used as synonyms words. After referring the various references, it is revealed that the term Greeva is applicable for entire extent of neck region. This region is one of the functional area of praanVayu .The classics have designated this region as a Pranayatana. However, Sushruta has included this Marma under Sadyopraanahara category (instant death). As per the classical description it is comprised of four Sira (Vessels) on either side of the neck On injury, they give rise to instant death or death within seven days. Vagbhata has opined that the four Sira situated bilaterally on the sides of the Kanthanaadi (larynx and trachea.) going to the tongue and noses are known as Matruka.

This above explanation indicating the vascular structure in this area, responsible to sustain the life.On this basis, the four important blood vessels of the neck i.e. subclavian artery, subclavian vein, common carotid and jugular vein are determined as chief resource of nourishment of head and neck.These vessels have very close relation with vagus, glossopharyngeal, hypoglossal nerves and sympathetic plexus. Vagus and glossopharyngeal are forming the nervous plexus around the carotid arteries. The vagus nerve is giving branch to heart which increases the heart rate and blood pressure, on the contrary glossopharyngeal nerve stimulates the cardio-inhibitory centers of brain stem on its irritation.[17]This explanation reveals the vitality of this region.

These vital neurovascular structures are lying in the four Angula (8cm) circumferential areas. Any piercing injury to these blood vessels may cause severe bleeding leading to death or may damage the apical pleura in the region resulting in hemothorax leading to death. Even blunt trauma to these structures may cause vaso-vagal reflex resulting in irreversible shock leading to death. Hence, these structures may be accepted for Matruka Marma. Sadyopraanahara in Parinaam and vascular (Sira) in configuration.

Relatively inelasticity and large diameter of the internal jugular vein causes laceration , usually treated by ligation , but some time however it may result in visual disturbances, headache, papilledema, oro-pharyngeal edema and even death. The wounds of the lower zone of the neck extends fromthe clavicle to cricoid cartilage and more particularly involves common carotid, internal jugular, and subclavian vessels.[18]

Ayurvedic Acharya might have observed the unique attribute of these vessels. Vagbhata's finding appears to be relevant surgically when ligation of common carotid artery and internal jugular vessels produce surgical complication to nose and tongue. Bilateral ligation of internal jugular vein may cause or pharyngeal edema. This shows that secondary effect of internal jugular ligation on oral cavity, which proves surgical relation between internal jugular ligation on oral cavity. The ligation of common carotid artery may cause necrosis of the tip of the nose.[18]

The consequences of carotid trauma are impeding the quality of life. They often cause thrombosis and delayed neurologic deficits, and are associated with mortality rates of up to

40%.Common carotid injuries are associated with internal jugular vein injuries and thus have higher mortality. Subclavian venous injury has a higher mortality than subclavian arterial injury, probably because of possible air embolism and inability of the vessel to contract. Proximal injuries may require sternotomy with lateral extension. Access can also be gained by thoracotomy and transclavicular approaches. Veins can be ligated but arteries should be repaired where possible. Ligation of arteries is associated with increased morbidity.[19]

The common carotid artery is relatively unprotected in the lower neck making it susceptible to injury from a direct blow to that area. In a series of 124 patients with penetrating carotid injury, the pre hospital mortality rate was 56%, with an overall mortality of 66%. The reported mortality rate from penetrating carotid artery injury is as high as 66%, with many patients dying before reaching medical care and10% to 20% mortality rate among those who survive to hospital admission.[20] Approximately 20% of patients with subclavian vascular injuries, both the artery and vein are injured. Many victims with subclavian vascular injuries die before reaching medical care.

In a study of 228 patients with subclavian vascular injuries, 61% were dead before arrival to the hospital. In another study of 79 patients with subclavian or axillary vascular injuries, 23% were dead or near death on arrival to the hospital. Only selected patients with short prehospital times and contained hemorrhage due to thrombosis or local hematoma reach the hospital in stable condition[20]. This indicates why this region is included under vital category with emphasis of vascular dominancy. The wall of the external jugular vein is adherent to the margin of the opening of the deep fascia through which it passes, therefore the vein cannot collapse at this point, if the vessel is cut in this region, there is danger of air embolism by the suction of the chest in inspiration. A venous air embolism produced in this way will fill the right side of the heart with froth, which nearly stops blood flow through it, resulting dyspnoea[21].

Gunshot wounds (GSWs) are significantly more likely to be associated with large neck hematomas, hypotension on admission, and vascular or aero-digestive injuries than knife wounds.In a prospective study of 223 patients with penetrating neck injuries, in Los Angeles, GWSs were 3 times more likely to cause a large hematoma than stab wounds (20.6%vs.6.7%), twice as likely to be associated with hypotension on admission (13.4%vs.7.9%), twice as likely to result in a Vascular injury (26.8%vs.14.6%),twice as likely to cause injury to the aero-digestive structures (7.2%vs.3.4%), and 13 times as likely to cause spinal cord injury (13.4%vs.1.1%). Overall, approximately 35% of all GSWs and 20% of stab wounds to the neck are associated with significant injuries to vital structures, but only 16.5% of gunshot wounds and 10.1% of stab wounds require a therapeutic operation. Overall, in penetrating trauma the most commonly injured structures in the neck are the vessels, followed by the spinal cord, the respiratory, digestive tracts, and nerves[22,23].

This indicates that any injury of this area needs meticulous management and majority time need exploration of neck. More than 4000 cases of neck wounds were reported during the American civil war, with a mortality rate of approximately 15%. During World War I, the mortality rate for cervical injuries was approximately 11%, by World War II, this rate had declined to 7%. Wartime surgeons of the last century are credited with the development of many of the principles for the management of penetrating neck trauma[24]. In ancient days, there were no sophisticated technologies in surgical field so mortality rate was more in this era even though the percentage of mortality is decreased because of sophisticated technology but risk of morbidity and mortality has not completely abolished.

CONCLUSION

This critical review reveals that Matruka Marma are situated in the lower 2/3 of the neck, where common carotid artery, internal jugular vein, subclavian vessels are frequently exposed to the injury and usually fatal. Therefore, it is suggested to ascertain the location of Matruka Marma in lower 2/3 of the neck.Vagbhata's view coincides that Matruka Marma, situated by the side of Kanthanaadi. Therefore, the four vessels by the sides of trachea extending from the sterno-clavicular joint to the thyroid cartilage are suggestive of Matruka Marma.

From above discussion, Sushruta's surgical observations and experience are appreciated well. In case of Neela Manya Marma (Vital point) concomitant injury to nerves and vessels in the sub mandibular region manifesting loss of taste, speech and abnormal voice by involving the tongue, pharynx and larynx and in case of Matruka Marma, injury to above-mentioned blood vessels exhibiting the instant death is credible in today's era too.

REFERENCES

1. Acharya JT. Charaka Samhita with Ayurveda Dipika commentary of Chakrapani Datta. Reprint ed. Varanasi (India): Chaukhamba Orientalia; Vol II. P483.
2. Demetriades D, Skalkides J, Sofianos C, Melissas J, Franklin J: Carotid artery injuries: experience with 124 cases. J Trauma 1989; 29:91–4.
3. Sushruta, Nagarjuna. Shareerasthana, Pratyeka marmanirdesha shaarir, chapter 6, verse 7. In Sushruta Samhita, JadhavjiT, Narayan Ram Acharya, editor. Reprinted edition 2008. Varanasi: Chaukhamba Surabharati Prakashan; 2008. p. 370.
4. Bharadwaj Vinaya Shankara, Bedekar Swati Sanjay, Kulkarni Bhagwan Gangadhar, Uma B Gopal. A study of Lohitaksha marma with special reference to lower limb. Int. Res. J. Pharm. 2015; 6(2):157-160 http://dx.doi.org/10.7897/2230-8407.06234
5. Mishra JN. Marma and its Management. 1st ed. Varanasi; Chaukhamba Orientalia. 2005, p 28.
6. Sushruta, Nagarjuna. Shareerasthana, Pratyekamarmanirdeshashaarir, chapter 6, verse 27. In Sushruta Samhita, Jadhavji T , Narayan Ram Acharya, editor. Reprinted edition 2008. Varanasi: Chaukhamba Surabharati Prakashan; 2008. p.374.
7. Chaurasia BD,Human Anatomy Regional and Applied.3rded. New Delhi: CBS Publishers & Distributors, 1995, Vol 3.p.94-7.
8. Moeng, K. Boffard.Penetrating neck injuries.Scandinavian journal of surgery 91: 34–40, 2002.
9. http://en.wikipedia.org/wiki/Carotid_sinus. Date; 29.06. 2015
10. Datta AK, Essentials of Human Anatomy. 3rded.Kolkata: Current Books International,2009, Vol.2.p.327.
11. Datta AK, Essentials of Human Anatomy.4th ed.Kolkata: Current Books International, 2009, Vol.2.p.93.
12. Perry MO, Syder WH, Thal ER. Carotid Artery Injuries Caused by Blunt Trauma.Ann.Surg.July 1980;Vol. 192.1.p.74-7
13. Verma RK, Kaushal D, Panda NK. External Jugular Vein Aneurysm with Thrombus Presenting as Painful Neck Mass: A Case Report. Oman Med J 2013 Jul; 28(4):278-280.
14. Datta AK, Essentials of Human Anatomy.4th ed. Kolkata:Current Books International,2009, Vol.2.p.129

15. Du Toit DF. The tongue:structure and function relevant to disease and oral health. SADJ.2003. Oct; 58(9):375-6,380-3.PMid: 14964052.
16. Kagami H, InabaM, IcimuraS, Hara K, Inamasu J.Endovascular Revascularization of External Carotid Artery Occlusion Causing Tongue Infarction. Meurol Med Chir.2012; 52:910 -13. http://dx.doi.org/10.2176/nmc.52.910
17. Datta AK, Essentials of Human Anatomy.4th ed.Kolkata:Current Books International,2009, Vol.2.p.325
18. Mishra JN. Marma and its Management.1st ed.Varanasi; Chaukhamba Orientalia.2005,p 184- 98.
19. MoengS, Boffard K.Penetrating Neck Injuries.Scandinavian Journal of Surgery 91:34–40, 2002
20. Neck injuries. Curr Probl Surg 2007; 44:40.doi:10.1067 /j.cpsurg.2006.10.004. Available on https://www. researchgate.net/publication/6489601_Neck_Injuries.
21. Shobha G**.** A cadaveric study on Kantha as Pranayatana**.**Thesis; Rajiv Gandhi University of Health Sciences Karnataka; 2014**.p.**139
22. Demetriades D, Theodorou D, Cornwell EE, et al. Evaluation of penetrating injuries of the neck: prospective study of 223 patients. World J Surg 1997; 21:41-8.
23. Demetriades D, Velmahos GC, Asensio JA. Penetrating injuries of the neck. In: Shoemaker W.Editor. Textbook of Critical Care. 4th ed. WB Saunders, Philadelphia 2000; Chapter 29, pp 330-7.
24. http://emedicine.medscape.com/article/869579-overview# showall. 29.06.2015

Cite this article as:

Kulkarni BG, Kanthi GM. Ancient thoughts of neuro-vascular injuries of neck in the pre view of marma (vital points): A review. Int. J. Res. Ayurveda Pharm. May - Jun 2016;7(3):8-12 http://dx.doi.org/10.7897/2277-4343.073101

Source of support: Nil, Conflict of interest: None Declared

Disclaimer: IJRAP is solely owned by Moksha Publishing House - A non-profit publishing house, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. IJRAP cannot accept any responsibility or liability for the site content and articles published. The views expressed in articles by our contributing authors are not necessarily those of IJRAP editor or editorial board members.