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A COMPREHENSIVE STUDY ON SHIRO MARMAABHIGHATALAKSHANAS IN PATIENTS WITH INTRACRANIAL NEUROLOGICAL DISORDERS

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ABSTRACT

Objectives- To Screen for *urdva-jatrugatamarmaviddhalakshanas* in patients suffering from neurological lesions of brain, localize the area of lesion with the aid of C.T and M.R.I, and to statistically analyze the type of *marma* and its *viddhalakshanas* with the symptoms of neurological lesions. **Review of literature-** Historical review of *Marma*, Ayurvedic literary review of *Marma*, Ayurvedic literary review of *shirogatamarma*, Modern review on brain anatomy. **Methodology-** Literary works, books, journals including all published on the concept related to the subject, 100 patients diagnosed with intracranial lesions along with CT and MRI scans were selected from OPD and IPD of SDM Ayurveda Hospital Udupi. **Discussion-** It comprises the details of the collected data and comparison with those mentioned in the ancient literature & modern anatomy texts. **Conclusion-**The observational results were statistically analyzed and it was concluded that the *shirogatamarmaabhighatalakshanas* could be analogous to the intracranial lesions associated with the cortical area of the brain.

Keywords: *Marma, shirogata marma abhighatalakshana*, intracranial lesions, CT & MRI scan

INTRODUCTION

Marmaabhighata (injury to vital areas) can be due to *dosaabhighata* (internal factors) or*bahyaabhighata* (external factors). The term *sadhyopranahara* does not necessarily mean immediate or sudden death. Rather it can be taken as conditions of neuro-pathological lesions affecting the cerebrovascular system of body. The patients may survive with life support systems or with impaired vitality. The impaired vitality can be assessed by Glasgow coma scale objectively. The *vaikalyakara marmaabhighata* resulting in deformities can be assessed by detailed neurological examina-

tion. Imaging studies like CT scan or MRI scans help in locating the lesions accurately.

The subject of the study is - Whether a comprehensive analysis of clinically assessed *marmaabhighatalakshana* in the back ground of CT or MRI image studies show any common feature or not. Such a study may result in a new perception about the *marma*.

OBJECTIVES

To Screen for *urdva-jatrugatamarmaviddhalakshanas* in patients suffering from neurological lesions of brain, localize the area of lesion with the aid of C.T and M.R.I, and to statistically analyze the type of *marma* and its *viddhalakshanas* with the symptoms of neurological lesions.

MATERIALS AND METHODS

- Ayurvedic literary works such as andjournals including all publications related to the concept was reviewed and related information were collected and analyzed scientifically.
- 100 patients diagnosed with intracranial lesions were selected from OPD and IPD of SDM Ayurveda Hospital Udupi.
- CT and MRI scans of patients suffering from intracranial lesions had been reviewed and related information were collected and analyzed scientifically.

Name of books referred	**Chapters**
Susrutha Samhita	*Sutra sthana, Shareera sthana*
Charaka Samhita	*Chikitsa sthana, Siddhi sthana*
Asthanga Sangraha	*Shareera sthana*
Asthanga Hrdaya	*Shareera sthana*
Bhavaprakasha	*Purvakhanda*
Modern Anatomy books: Gray's anatomy Richard Snell's Clinical Neuro-anatomy B D Chaurasia Human Anatomy Volume 3 & 4 A K Datta Human Anatomy Volume 2 & 4	

REVIEW OF LITERATURE

The term *marma* is derived from mru *dhatu+ manin prathyaya* meaning *jeevasthana* (site of life) and *sandhisthana* (meeting place).[1] *Marma* is meeting place of structures such *mamsa* (muscle), *sira* (arteries or veins), *asthi* (bone), *snayu* (fibrous tissues) and *sandhi* (joints) along with *prana.*[2]*Marma* is referred to as a *pradesha* or region on the body which when injured causes death or deformities.

A Total number of 107 *marma*s are mentioned by various Acharyas. Acharya Susrutha has further classified these 107 *marmas* into 5 different sub groups based on various factors.[3] The 5 groups include:-

1. *Ashraya bhedena* – based on structural classification
2. *Vikalpa bhedena* – based on prognosis & on basis of *dosa* predominance
3. *Shadanga bhedena*- based on regional classification
4. *Pramana* or *maana bhedena* i.e. based on dimensional classification and

5. *Sankya bhedena* – based on numerical classification.

Sira which is present in *marma* region is of 4 types – *vatavaha, pittavaha, kaphavaha* & *raktavaha*, and which helps in nourishment of the other 4 *marmavasthu* (vital structures).[4]Any Injury to the *marmasthana* (vital areas) leads to vitiation of *vayu*. The vitiated *vayu* spreads & covers the *sira*, producing severe pain and also certain symptoms. Acharya Susrutha mentions *vishesha lakshana* (individual clinical symptoms of injury) including *indriyaartheshu asamprapthi* and *samanyalakshana* (general clinical symptoms of injury) including *bhrama, pralapa* etc. will be produced.[5]

Acharya Susrutha mentions general clinical symptoms of injury of *marma* as vertigo, delirium, collapse, dazed state, loss of movements, unconsciousness, rise of temperature, flaccidity of extremities, fainting, dyspnea, severe pain of various kinds caused by vata, flowing out of blood similar to color of meat washing & loss of functions of all the senses.[6] Whereas Acharya Charaka mentions stiffness of neck, paralysis of muscles on one side of face & neck, agitation of eye, unconsciousness, *utveshatana*, loss of motor activities, cough, dyspnea, stiffness of mandible, dumbness, slurring speech, ptosis, pulsation of neck region, yawning, excessive salivation, loss of ability to produce speech and twisting of face as the symptoms produced when there is injury to the head.[7]

Acharya Susrutha mentions *sthana* (site), *Sankhya* (number), *Viddhalakshana* (signs and symptoms of injury) & *Pramana* (measurement) for each of the *shirogatamarma* separately. Table 1 shows the details of *shirogatamarma* (vital areas in head and neck region) according to Acharya Susrutha. Table 2 shows the signs and symptoms of injury to *shirogatamarma* according to Acharya Susrutha

OBSERVATIONS AND RESULTS

The maximum incidence of *Mookata* (Aphasia), *Swaravaikrita* (Dysarthria) and *Arasagrahita* (Ageusia) were observed in lesions associated with subcortical (38%), cortical (63.8%) and sub thalamic (42.5%) areas respectively. *Indriyaartheshu asamprapthi*(loss of sensations) and *Rujascha vividdha teevra* (various kinds of neurological pains) were observed in lesions associated with the sub thalamic area of brain (each 100%). *Manobhudhi viparyaya* (loss of higher mental functions) were observed in lesions associated with the sub-cortical area (61%). *Chalamoordata* (instability of head) and *Bhadhiryam* (deafness) were observed in sub-cortical area (53% and 61% respectively), *Gandha ajnanata*(loss of smell sensation)in sub-thalamic area (50%) and both *Aanthyata* (blindness) and *Dristyupaghata* (impaired vision) in cortical areas (2% and 53.1% respectively) corresponding to the various visual perceptional areas of the brain. *Unmada* (psychological disturbance) and *Chittanasha* (loss of consciousness) were observed in the sub-cortical areas (7% and 38% respectively) and *Bhaya* (phobia) in the sub-thalamic areas (37.5%). Table 3 gives the statistical data obtained from the study of *visheshashiromarmaabhighatalakshana* (symptoms of injury to vital areas in head) in 100 patients with intracranial lesions corresponding with the various areas of brain:

DISCUSSION

In the study 100 patients diagnosed with intracranial lesion were taken and the screening

was done to verify the possibility of clinically assessing *lakshanas* of *shirogatamarmaabhighata* (symptoms of injury to vital areas in head). The following points are discussed:-

Discussion on the review of literature

Marmasthanas are the specific regions of the body where there is conglomeration of *mamsa*, *sira*, *snayu*, *asthi* and *sandhi* and the seat of *prana*. *Marmasthanas* are referred as *jeevasthana*, *sandhisthana*, *chethananibhadha*, *jeevadharini* etc. all referring to seat of life as well to the importance of vulnerability of the *marmasthana*. Any injury or trauma or diseases afflicting these *sthana*s results in death or death like symptoms. There are 107 *marma*s in total. *Shirogatamarma*s are 37 in number including- *neelaa*, *manya*, *matrika*, *krikatika*, *vidhura*, *phana*, *apanga*, *aavartha*, *sankha*, *utkshepa*, *sthapani*, *seemantha*, *Sringhataka* &*Adipathi*. Their *sthana* (location), its number, the predominant *marmavasthu* (predominant anatomical structure), *Pramana* (measurement) along with the effects if injured are all described by all Acharyas.

The *shirogatasadhyopranaabhighatalakshana* such as *Indriyaartheshu asamprapthi*, *mano bhudhi viparyaya* and *Rujascha vividdha teevra* can be observed as clinical manifestations such as loss of sensations, loss of higher mental functions and various kinds of neurological pains in patients with neurological lesions like cerebro-vascular accidents respectively. The *shirogatavaikalyakaramarmalakshanas* can be observed as various deformities afflicting the patients with intracranial lesions. The deformities include *Mookata*, *Swaravaikrita*, *Arasagrahita*, *Chalamoordata*, *Bhadhiryam*, *Gandha ajnanam*, *Aanthyam* and *Dristyupaghata*, which can be observed as Aphasia, Dysarthria, Ageusia, Instability of head, Deafness, Loss of smell sensation, Blindness and Impaired vision respectively. The *shirogatakalantharapranaharalakshanas* (areas when injured result in dead gradually) like *Unmada*, *Bhaya* and *Chittanasha* can be taken as the impairment of the psychiatric problems afflicting the neurological deficit patients with traumatic history.[8]

Discussion regarding *marmaabhighatalakshana*

The symptoms were defined based on the classical reference and clinically presented symptoms. Based on the clinical symptoms and the pathological findings, the areas of lesions were categorized into 4- cortical, subcortical, thalamic and sub-thalamic. These areas of the brain mostly represent specific structural and functional centers for receiving information and their integration as well as interpretation. The cortical area represents the cortex of cerebrum responsible for the sensory and motor responds along with conscious functions of the body. The sub-cortical area represents the associate, commissural and projecting fibers responsible for intermediate coordinating areas for conscious and sub-conscious functions. The thalamic area represents the thalamus, basal ganglia, internal capsule etc. responsible for the sub-conscious functions. The sub-thalamic area represents the cerebellum and the brain stem responsible for the postural regulations as well as many cardinal functions of the body. Figure 1-4 shows the normal MRI brain Scan axial view of various regions of brain.

Mookata, *Swaravaikrita* and *Arasagrahita* are *abhighatalakshanas* of *neelaa* and *manya-marma*. *Neelaa* and *manya* are mentioned as *vaikalyakaramarma* of the *shiro pradesha*. In

the pathogenic sequel of the injury to any *marmasthana, vayu* gets aggravated first, then it gets diffused into the surrounding areas and later spread throughout the whole body by the *sira*s traversing through the *marmasthana*. By gaining momentum, the *vayu* causes various kind of severe pain. When the pain becomes unbearable, the functioning apparatus of the body slowly collapse i.e. there will be destructions of *shareera dhathu* (body tissue) and the person losses orientation and becomes unconscious finally resulting in the death of the person. The predominance of *soma tatva* in the *vaikalyakaramarmasthana* the life is supported because of its *sthiratva guna* (firmness) and *shaitya guna* (coldness), but the injured person sustains some kind of deformity. Both *neelaa* and *manyamarma* are mentioned as *siravasthu* predominant *marma*. Vitiation of *sira*by the aggravated *vayu* will result in many diseases. Vitiation of both the *vagvahasira* (vessels for sound production) and *rasavahasira* (vessels for taste sensation) located in the neck region by the *vayu* may be one of the reasons for the symptoms such as *Mookata*, *Swaravaikrita* and *Arasagrahita*.

Indriyaartheshu asamprapthi, *manobhudhi viparya* and *Rujascha vividha teevra* are the *samanyaviddhalakshana* for the group of *shirogatasadhyo-pranaharamarma* including- *Matrika, Sankha, Sringhataka* and *Adipathimarma*. *Matrika* and *Sringhataka marma* are mentioned as *siravasthu* predominant *marma*s. Injury to this *marma* aggravates the *vayu* which in turn vitiates the *sira*s traversing through the area. Through this vitiated *sira* the aggravated *vayu* diffuse into the surrounding areas and later spread through-out the whole body producing various kinds of severe pain and many diseases. *Sankhamarma* is mentioned as an *asthivasthu* predominant *marmasthana*. Injury to *asthi dhathu* leads to severe pain and anxiety because no matter what management is done the pain persist. Because of the *Agni tatva* predominance further worsen the symptoms. *Adipathimarma* is mentioned as a *sandhivasthu* predominant *marma*. In the *sadhyo-prana-haramarma* there is predominance of *Agni tatva*, which becomes *asukari* (immediately fatal) when vitiated by any injury or aggravated *vayu*. The aggravated *Agni tatva* produces depletion of the *shareerika dhathu* and because of its *asukari* nature it speeds up the process of destruction, thereby resulting in immediate death of the injured person. The symptoms caused by injury to *sadhyo-prana-haramarma* are followed by death within 7 days if immediate and proper emergency management is not done. But the term *sadhyopranahara* does not necessarily mean immediate or sudden death. In this era the advancement of emergency management facilities have made it possible to help the person survive. Also it can be taken as conditions of neuro-pathological lesions affecting the cerebrovascular system of body. The patients may survive with life support systems or with impaired vitality.

Chalamoordata is mentioned as the *abhighatalakshana* of the *krikatikamarma*. *Krikatikamarma* is one of the *vaikalyakaramarma* having *sandhivasthu* predominance. Injury to the *vaikalyakaramarma* leads to deformity- here *Chalamoordata*-inability to hold head in normal position. *Bhadhiryam* is mentioned as the *abhighatalakshana* of the *vidhuramarma*. *Vidhuramarma* is a *shirogatavaikalyakaramarma* having *snayuvasthu* predominance. *Gandha ajnanata* is mentioned as the *vaikalyakaralakshana* resulting from injury to the *phanamar-*

ma. *Phanamarma* is having predominance of *siravasthu*. *Aanthyata* is mentioned as the *viddhalakshana* for the *shirogatavaikalyakaramarmas* such as *Apanga* and *Aavarthamarma*. *Apanga* is mentioned as *siravasthu* predominant *marma* while *Aavartha* is mentioned as *sandhivasthu* predominant *marma*. *Dristyupaghata* is mentioned as the *viddhalakshana* for *shirogatavaikalyakaramarma* such as *Apanga* and *Aavarthamarma*. *Apanga* is mentioned as *siravasthu* predominant *marma* while *Aavartha* is mentioned as *sandhivasthu* predominant *marma*.

Unmada, *Bhaya* and *Chittanasha* are mentioned as *viddhalakshana* of *seemanthamarma* which is the only *kalantharapranahara* having *sandhivasthu* predominance. *Kalantharapranaharamarmas* have *soumya-agneya tatva* predominance. When any injury to *kalantharapranaharamarma* occurs, the *agneya tatva* causes the immediate depletion or destruction of *shareerika dosa*, *dhathu* and *mala* resulting in *aashuksheena* (immediate loss of energy). But the presence of *soumya tatva* slows down the process of destructions initiated by the *Agni tatva*. Resulting in gradual destruction of dhathu and producing severe pain and finally leading to the death of the person. Here in the *seemanthamarma* injury leads to above mentioned symptoms occur in sequential order finally leading to the death of the person.

The two *vishalyagnakaramarma- uktshepa* and *sthapanimarmaviddhalakshana* were not considered in the study because the incidence of such symptoms was not seen as a clinical presentation in patients with the intracranial lesions such as CVA. Hence they were not taken in the study.

In the study a total of 14 *shiro marmaabhighatalakshana* were considered. These symptoms were further grouped based on the incidence of lesions in various areas of the brain. In these areas of brain, out of these 14 symptoms – a maximum of 8 symptoms were observed in 8 patients with lesions in cortical area of brain. This shows that a maximum of symptoms were observed in the cortical area of the brain.

CONCLUSION

This was an observational study signifying the fact that it was possible to clinically asses the *shirogatamarmaabhighatalakshana* on patients diagnosed with intracranial lesion. Analysis of the clinical symptoms and the pathological findings obtained from the CT & MRI scan, presented with a gross idea about the probable area of lesion corresponding to the *marmaabhighatalakshanas*. A statistical analysis shows that the maximum number of symptoms can be identified with the cortical area of the brain. Based on the analysis of the clinical symptoms and the pathological findings obtained from the CT and MRI scans observed in 100 patients, the observational study results could be concluded with the prospect that the *abhighatalakshanas* of *shirogatamarma* could be analogous with the lesions affecting the cortical areas of the brain.

Future scope of study-The *Samanyamarmaabhighatalakshanas* were presented as symptoms during the initial onset of stroke condition or soon after afflicted with any traumatic head injury. These symptoms can be taken as transitional symptoms. In the study, only the persistent symptoms of the patient at the time of case screening were considered. These symptoms could be studied and further analyzed for any future projects.

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Table 1: Shows the details of *shirogatamarma* according to Acharya Susrutha.

Sl. No	Name of *marma*	Location of *marma*	Number of *marma*	Predominant *Marmavasthu*	*Pramana* of *marma*
1.	*Neela*	On either side of *kanthanadi*	2	*Sira*	*Swa-panitala*
2.	*Manya*	On either side of *kanthanadi*	2	*Sira*	*Swa-panitala*
3.	*Matrika*	On either side of neck region	8	*Sira*	*Swa-panitala*
4.	*Krikatika*	Junction between the *shiras* and *greeva*	2	*Sandhi*	*Ardhangula*
5.	*Vidhura*	Behind and below the ear	2	*Snayu*	*Ardhangula*
6.	*Phana*	On the internal aspect of *nasa sroto-marga* on it's either side.	2	*Sira*	*Ardhangula*
7.	*Apanga*	Below the end of eyebrow and outside the orbital region.	2	*Sira*	*Ardhangula*
8.	*Aavartha*	Just above the eyebrow	2	*Sandhi*	*Ardhangula*
9.	*Sankha*	Above the ending of eyebrow	2	*Asthi*	*Ardhangula*

		in the midway between the *karna* and *lalata*			
10.	*Utkshepa*	Just above the *sankhamarma* at the beginning of hair in scalp.	2	*Snayu*	*Ardhangula*
11.	*Sthapani*	Between the two eyebrows	1	*Sira*	*Ardhangula*
12.	*Seemantha*	In the sutural regions of scalp.	5	*Sandhi*	*Swa-panitala*
13.	Sringhataka	*Sira* which is located in the internal aspect of head and which is equidistant from *grana, srotra, akshi* and *jih-wa.*	4	*Sira*	*Swa-panitala*
14.	Adipati	In the internal aspect of back of head region where there is confluence of *sira*.	1	*Sandhi*	*Ardhangula*
TOTAL			37		

Table 2: Shows the signs and symptoms of injury to *shirogatamarma* according to Acharya Susrutha

Name of *marma*	*Viddhalakshana*- effect of injury
*SADHYOPRANA*HARA *MARMA*:- 1. *Matrika* 2. *Sankha* *3. Sringhataka* 4. *Adipati*	*Samanyaviddhalakshana*:- 1. *Indriyaartheshu asamprapthi* 2. *Mano bhudhi viparyaya* 3. *Rujascha vividdha teevra* *4. Marana*
*KALANTHARAPRANA*HARA *MARMA* 1. *Seemantha*	*Samanyaviddhalakshana*:- *1. Dhathu kshaya* *2. Vedana* 3. *Marana* *Visheshaviddhalakshana*:- 1. *Unmada* 2. *Bhaya* 3. *Chittanasha* *4. Marana*
VISALYAGNAKARA MARMA 1. *Utkshepa* 2. *Sthapani*	*Samanyaviddhalakshana*:- Death occurs if the salya is removed
VAIKALYAKARAMARMA *1. Neela* 2. *Manya*	 *Mookata* *Swaravaikrita* *Arasagrahita* *Mookata* *Swaravaikrita* *Arasagrahita*

3. *Krikatika*	*Chalamoordata*
4. *Vidhura*	*Bhadhiryam*
5. *Phana*	*Gandha ajnanam*
6. *Apanga*	*Aanthyam* *Dristyupaghata*
7. *Aavartha*	*Aanthyam* *Dristyupaghata*.

Table 3: Gives the statistical data obtained from the study of *vishesha* shiro *marmaabhighatalakshana* in 100 patients with intracranial lesions corresponding with the various areas of brain:

VisheshamarmaViddhalakshana	Cortical region (%of patients)	Sub-cortical region (% of patients	Thalamic region (% of patients)	Sub-thalamic region (% of patients)
1. *Mookata*	23.4%	38%	28%	25%
2. *Swaravaikrita*	63.8%	30%	21.8%	62.5%
3. *Arasagrahita*	42.5%	15%	25%	37.5%
4. *Indriyaartheshu asamprapthi*	74.4%	92%	90%	100%
5. *Mano bhudhi viparyaya*	40%	61%	43%	25%
6. *Rujascha vividdha teevra*	61.7%	61%	50%	100%
7. *Chalamoordata*	38.2%	53%	25%	25%
8. *Bhadhiryam*	51%	61%	37%	37.5%
9. *Gandha ajnanam*	38.2%	15%	28%	50%
10. Aandhyam	2%	0%	0%	0%
11. *Dristyupaghata*	53%	30%	37%	50%
12. Unmade	2%	7%	0%	0%
13. *Bhaya*	12.7%	7%	0%	37.5%
14. *Chittanasha*	25.5%	38%	12.5%	0%
	Total:-47/100 patients	Total:- 13/100 patients	Total:- 32 /100patients	Total:- 8 /100 patients

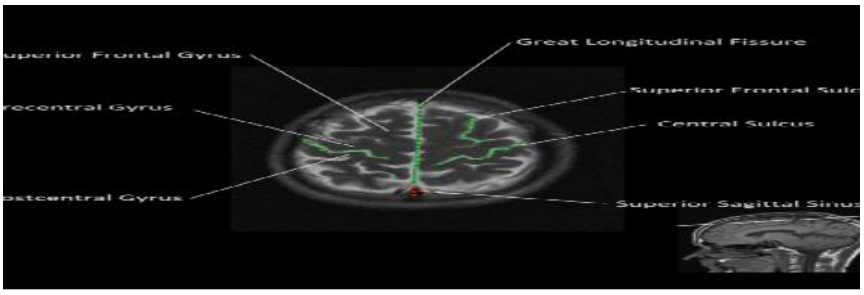

Fig 1 showing MRI brain –normal axial view of cortical regions

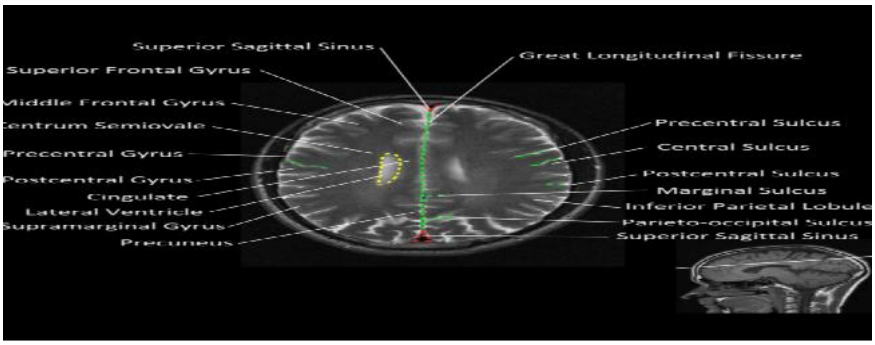

Fig 2 showing MRI brain – normal axial view of sub-cortical regions

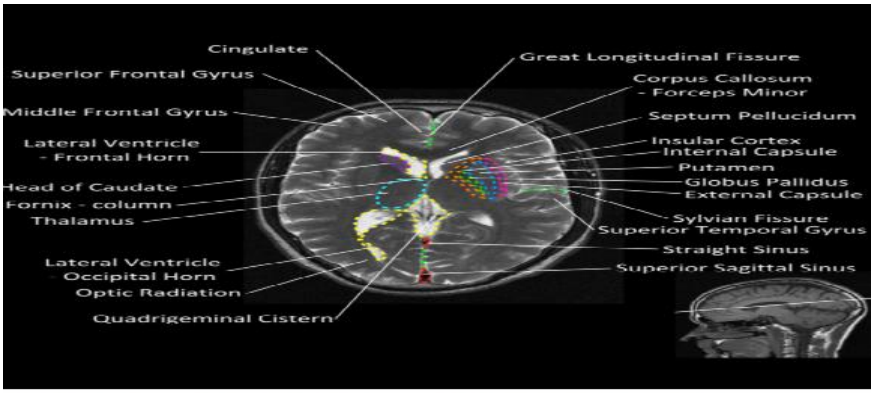

Fig 3 showing MRI Brain– normal axial view of thalamic region

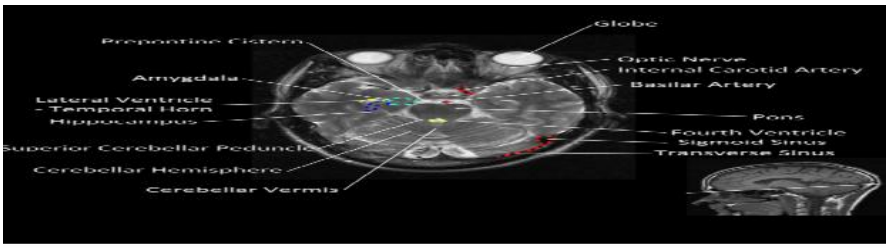

Fig 4 showing MRI –brain scan normal axial view of sub–thalamic regions

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