Bharath
INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed-to-be University under section 3 of UGC Act, 1956)
(Vide Notification No. F.9-5/2000 - U.3, Ministry of Human Resource Development, Govt. of India, dated 4th July 2002)
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NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL
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173, Agaram Road, Selaiyur, Tambaram,
Chennai - 600 073. Tamil Nadu.

Ref. No.SMS-2015-O-07

Date: 17.02.2017

TO

Mr. Anandaramajayan
Assistant Professor/Anatomy
BIHER

Thro: Concern Head of the Department

Greetings!!!

We are happy to announce that the Research Advisory Committee has approved your proposal for Seed Money Scheme-2015 which was presented by you. You are requested to complete the proposal and send the progress report to the Dean Research in the prescribed time period.

Title of the Project: A Study on Bifurcation of Brachial Artery in South Indian Population

Seed Money Amount: Rs.1, 00,000/- (Rupees One Lakh Only)

Approved on: 15.02.2017

Payment details:

Voucher No.28 **Dated: 24.03.2017**

With Regards

Dean-Research

Bharath University

SELAIYUR, CHENNAI - 600 073, TAMIL NADU, INDIA.

CASH / PAYMENT VOUCHER

Date 24/03/2017

V.No. 28

Debit _____ Amount

Rs. 1,00,000/-

PAID TO Dr. Anandaramajeyan

RUPEES One lakh only

TOWARDS Seed Money Scheme-2015

BHARATH UNIVERSITY CHENNAI 600 073. INDIA.

Authorised by **Finance Manager** **Cashier/Accountant** **Payee's Signature**

PROPOSAL SUBMISSION

1. **Details of Principal Investigator**

Name	: N. Anandaramajayan
Designation	: Assistant Professor
Highest Qualifications	: M.Sc.,
Department	: Anatomy
E-mail	: anandaraman2006@gmail.com
Contact no	: 9894343517
Date of Joining	: 1-12-2010

2. **Details of Principal Investigator**

Name	: Dr. B Rajesh
Designation	: Professor
Highest Qualifications	: Ph.D.
Department	: Anatomy
E-mail	: anat_rajesh@rediffmail.com
Contact no	: 9345575143
Date of Joining	: 14.06.2010

Technical details

1. Introduction:

The main arterial supply of the arm comes from the brachial artery. It begins as the continuation of 3rd part of axillary artery, it extends from the lower border of teres major to the level of neck of radius. On its course it gives origin to arteriaprofundabrachii, superior & inferior ulnar collateral artery, nutrient artery and few muscular branches. Further it terminates in the Cubital fossa at a distance of 3.0cms from the intercondylar line, near the neck of radius into radial and ulnar artery. Variatons in the arterial anatomy are less frequent unlike venous system. Among the arteries of limbs brachial artery variations are the most reported ones, out of which a high division of brachial artery is the most common, least prevalent are the high origin of radial artery or the existence of a double brachial artery. In the upperlimb, six different patterns of brachial artery have been described till now. Anatomically and clinically the knowledge of detailed description of vascular pattern and its variations are of utmost important. Variations in the course and branching pattern of the brachial artery are of great importance in cardiac catheterization for angioplasty, radiology and arterial grafting.

2. Review of status of Research and Development in the subject

Rajan K. Trifurcation Of Brachial Artery–A Case Report. J Anat Soc india. 2001;50(2):163–5.

Arterial development of the upper limb

The upper extremity arterial system demonstrates an oversized number of variations, which probably are due to their complex embryonic development. The upper extremity arterial system demonstrates a large number of variations, which probably are due to their complex embryonic development. In order for a clinician to understand the mechanisms of the observed variants of HBBA, a brief reference should be made to the embryonic morphogenesis of the upper limb vessels. Each upper limb of the embryo is supplied by an axis artery (AA) that is derived from the seventh intersegmental (subclavian) artery (Rajan 2001). The AA develops in growth distally along the ventral axial line and terminates in a palmar capillary plexus in the hand. The main trunk of the AA forms the axillary artery (AXA), the BA, the anterior interosseous artery (AIA), and the deep

palmar arch. The superficial brachial artery (SBA) is a stable fetal vessel that plays an important role in the normal arterial morphogenesis of the upper limb. It has two final branches, a medium, which is the superficial artery of the forearm, and a collateral one, which continues in the forearm as part of the RA. The superficial artery of the forearm is divided into two final branches, median and ulnar. Each of these branches is anastomosed with a corresponding branch of the primitive axial, whose origin is in the medial artery (MA) and UA, respectively. Gradually, the branches with deep origin dominate hemodynamically, and the superficial artery of the forearm, along with the pro-anastomotic part of its final branches, subverts. Therefore, two distinct parts may be distinguished in both the MA and the UA, a proximal or a depth corresponding to branches with an origin from the primary axial artery and an upper or superficial one that represents the post-anastomotic parts of the final branches of the superficial artery of the forearm. The RA usually develops similarly to the MA and BA. That is, the final collateral branch of the SBA is anastomosed by a branch for the deep origin of the RA from the primitive AA.

Kumar V, Rathnakar P. Unilateral High Division of Brachial Artery/: a Case. nitte Univ J Heal Sci. 2014;4 (3):115–8.

The hemodynamic dominance determines the involution of the superficial parts of the arteries that are located near the anastomosis while the upper parts remain as part of the RA. An unusual induction and branching of primitive vascular plexuses, lead by vascular growth factors (such as vascular endothelial growth factor) and developmental hemodynamics, may result in variations such as a high bifurcation of the brachial artery. This description is in accordance with those given by Senior in 1926 and Singer in 1933. Similar patterns have also been described by Lippert and Pabst and later studies. Sieger et al., in 2019, emphasized the importance of angioblasts in the vascular pathway and highlighted their role along with variable developmental hemodynamics in the emergence of unusual arterial patterns. Abnormalities in this process of morphogenesis during the embryological life of the human embryo may result in a series of variations both concerning the origin and the course of the vessels of the upper limb. Surgeons and interventional physicians should have a thorough knowledge of brachial artery variations. HBBA might cause confusion during angiographic procedures. The unusual position of

the artery makes its recognition and catheterization difficult. The superficial course of the brachial artery might lead to serious injury and accidental intra-arterial injection. On the other hand, this abnormal course makes arterial grafting and cardiac catheterization easier. The abnormal arterial pattern of the upper arm, such as HBBA, might also complicate surgical procedures such as distal biceps tendon repair.

2.1. International Status:

Anomalies in origin of principal arteries might be prone to damage in orthopedic and plastic surgeries. Diagnostically the evaluation of angiographic images may be difficult In a Brazilian cadaveric study high division of brachial artery was found in only 0.5%. The bifurcation of the brachial artery was found above bicondylar line in 11.1% cases. In a recent study, early bifurcation of the brachial artery was found in the middle of the arm in 1 out of 25 cadavers.

2.2. National Status:

NIL

3. Progress/ achievement so far, if any

a) Reference papers were collected.

b) Literature survey was studied.

c) Proposal work has been started in drug collection, and ethical clearance

4. Work plan

4.1 Methodology

Experimental design

The selected animals weighed between 125 and 150 g and were in an estrous cycle. All of the animals had free access to food and water. Twenty-four rats were examined in the everyday vaginal cycle. Animals in groups 2 to 4 were administered letrozole with oral feeding needle for 21 days in the first stage (induced). Vaginal smear was examined to confirm development of PCOS. In the second stage (treatment), 22–42 days, the animals in groups 3 and 4 were treated with Bermuda grass extract and metformin respectively. The animals were weighed periodically on first day of induction, on the 21st day and on the 42nd

day. After 24 hours from the last dose of Bermuda grass extract and metformin the animals were anesthetized, decapitated and dissected. The ovaries and uteruses were meticulously removed and weighed using three digital accurate weighting balances. The mean value was calculated, and graph plotted using Excel document.

Study parameters

1. Normal course of the brachial artery in the arm

2. Brim of the brachial artery

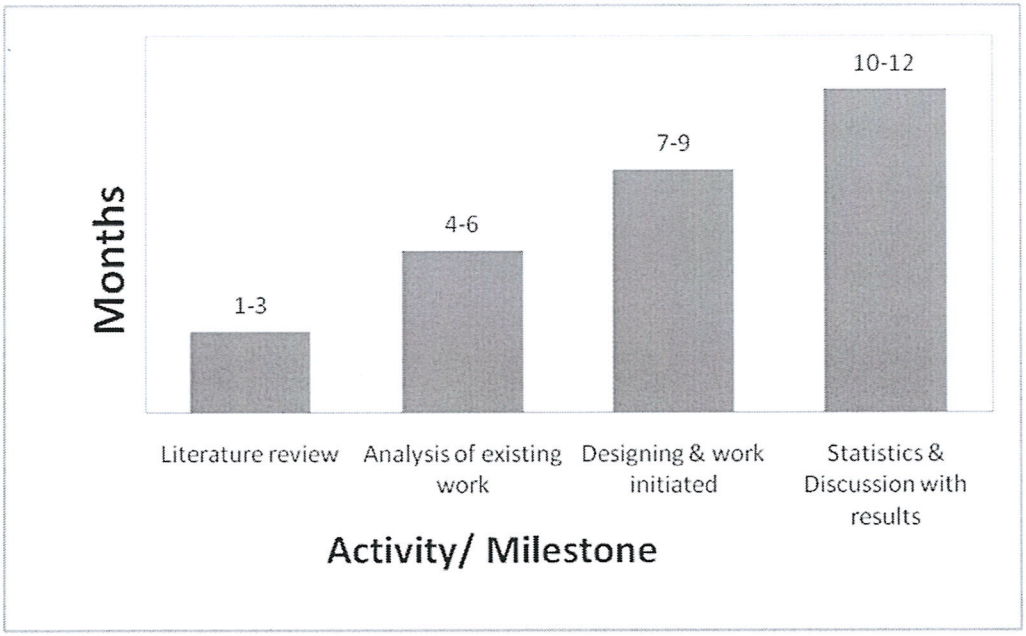
3. Terminal branching pattern of brachial artery

Data Analysis

Each set of experiments will be carried out at least in duplicate, and in triplicate in some cases. Experiments will be repeated separately to ensure reproducibility. In each set of repeated experiments, standard deviations and standard error should have 95% confidence interval.

4.2 Time Schedule of activities giving milestones through BAR diagram.(Maximum of 1/2 pages)

S.No	**Activity/ milestone**	**1st Year**			
1.	Literature review	**1-3 month**			
2.	Analysis of existing work	-	**4-6month**		
3.	Designing & work initiated	-	-	**7-9 month**	
4.	Statistics & Discussion with results	-	-	-	**10-12month**



4.3 Expected outcome within the time period of See Money Scheme

Clinicians and academicians will be well aware of this commonly occurring variation of higher terminal bifurcation of the brachial artery, with its course well before the cubital fossa and at the level of cubital fossa as it is an important artery of the upper limb used in various clinical procedures.

5. Suggested Plan of action stating the name of funding agency where the project will be communicated for financial support within the time period of project.

Nil

6. Bibliography:

Nil

7. List of Projects submitted/implemented by the Investigators (Separate for PI and Co-PI)

7.1 Details of Projects submitted to various funding agencies:

S.No	Title	Cost in Lakhs	Month of Submission	Role as PI/Co-PI	Agency	Status
1	NA	NA	NA	NA	NA	NA

7.2 **Details of Projects under implementation**

Sl.	Title	Cost in	Duration	Role as PI/ Co-PI	Agency
1	NA	NA	NA	NA	NA

7.3 **Details of Projects completed during the last 5 years**

Sl.	Title	Cost in Lakhs	Duration	Role as PI/ Co-PI	Agency
1	NA	NA	NA	NA	NA

8. List of publications published by the Investigators, if any:

a) Principal Investigator

S.No	Author names	Title of paper	Name of Journal	Vol (Issue)	Page No.	Year
1.	**1N.Anandaramajayan*,** 2K.C.Mallikarjuna.	Fused Typical Cervical Vertebra – A Case Report	Journal of Current Trends in Clinical Medicine & Laboratory Biochemistry	2(4)	64-66	2015
2.	**1N.Anandaramajayan*,** 2B.Rajesh.	Unilateral Renal Agenesis with variations in the vascular pattern of Testis, Supra Renal Gland And Diaphragm -A Case Report	Journal of Current Trends in Clinical Medicine & Laboratory Biochemistry	2(2)	66-72	2014
3.	1B. Rajesh*, **2N.Anandaramajayan,** 2V.Santhi, 3K.C. Mallikarjuna,3S.I. Tolanur, 4R. Praveen Kumar	An abnormal radicle of Median Nerve from Musculocutaneous nerve in the Arm	Journal of Current Trends in Clinical Medicine & Laboratory Biochemistry	1(2)	34-36	2013

b). Co-Principal Investigator

S. No	Author names	Title of paper	Name of Journal	Vol (issue)	Page no.	Year
1.	M. Senthil Murugan,[1,*] R. Sudha,[1] and **Rajesh Bhargavan[2]**	Clinical Significance of an Unusual Variation Anomalous additional belly of the sternothyroid muscle	Sultan Qaboos Universit y Med J,	16(4)	e491–494,	2016
2.	Mary Hydrina D'Silva,1 Rijied Thompson Swer,1 J. Anbalagan,1 and **Rajesh Bhargavan2**	Effect of Ultrahigh Frequency Radiation Emitted from 2G Cell Phone on Developing Lens of Chick Embryo: A Histological Study	Advances in Anatomy	10(2)	1-9	2014
3.	Vasudev Anand Rao, Subashini Kaliaperumal, Thanikachalam Subramanyan, Kotapalli Rachandra Rao, **Rajesh Bhargavan**	Goldenhar's sequence with associated juvenile Glaucoma in turner's syndrome	Indian Journal Of Ophthal mology	53(4)	267-268	2005

9. **Budget**

SI. No	Head	Amount (Rs.)
1	Equipment	30,000/-
2	Consumables (gels bottles, cotton, sprit, testing charges, tools, etc.)	30,000/-
3	Travel support for the purpose of research work.	10,000/-
4	Contingency	20,000/-
5	Others consumables	10,000/-
	Total	**1,00,000/-**

*In case of any joint proposal for purchasing a same equipment, each of the associated PLs is also required to give separate budget(without any clubbing) to avoid any ambiguity, if all the associated projects are not awarded by committee.

10. Name of at least two subject experts from the Institute and one from the outside Institute with their contact details:

1. **Dr. T K Balaji,** Professor in Anatomy, Chettinad Medical College Hospital and Research Centre, Chennai **Mobile No**: 9710905221 **E-mail id:** balajitk@gmail.com	2. **Dr. Senthil Kumar** Associate Professor in Anatomy, AIIMS, Nagpur **Mobile No**: 8524863767 **E-mail id:** senkumar@yahoo.co.in

CERTIFICATE FROM THE INVESTIGATOR

Project Title: A Study on Bifurcation of Brachial Artery in South Indian Population (Tamil Nadu and Puducherry)

It is certified that

1. I do hereby agree to submit a complete proposal for financial support to the external funding agency within the time period of SMS-2015.
2. I undertake that spare time on equipment procured in the project will be made available to other users.
3. I agree to submit a certificate from Institutional Biosafety Committee, if the project involves the utilization of genetically engineered organisms. I also declare that while conducting experiments, the Biosafety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in to.
4. I agree to submit ethical clearance certificate from the concerned ethical committee, if the project involved field trails/experiments/exchange of specimens, human & animal materials etc.
5. I agree to abide by the terms and conditions of SMS-2015, BIHER, and Chennai.

Name and signature of
Principal Investigator

Name and signature of
Co-Principal Investigator

Date: 11.01.2017
Place: Pondicherry

Forwarded by Head of the Department

Signature of the Head

DEAN
SRI LAKSHMI NARAYANA INSTITUTE OF MEDICAL SCIENCES
OSUDU, AGARAM VILLAGE,
KOODAPAKKAM POST,
PUDUCHERRY - 605 502

PROJECT EVALUATION FORMAT

Recommendation sheet

Name of the Principal Investigator	N. Anandaramajayan
Name of the Co-Principal Investigator	Dr. B. Rajesh
Name of the Department	Anatomy
Title of project	A Study on Bifurcation of Brachial Artery in South Indian Population (Tamil Nadu and Puducherry)
Recommendation of the evaluation committee (Recommended/Revision/Not Recommended)	Recommended
Financial allocation recommended	Rs. 100000/-

SI. No	Head	Amount (Rs.)
1	Equipment	30,000/-
2	Consumables (gels bottles, cotton, sprit, testing charges, tools, etc.)	30,000/-
3	Travel support for the purpose of research work.	10,000/-
4	Contingency	20,000/-
5	Others consumables	10,000/-
	Total	**1,00,000/-**

Name and Signature of the Research Advisory Committee members with date.

Internal Quality Assurance Cell ★ SLIMS ★ IQAC Pondicherry-01

(Dr. G. Jayalakshmi)