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Comparative Evaluation of Efficacy of Gomaya Mashi Udvartana with Petiswedana and Rodhradi Gana Udvartana with Petiswedana in the Management of Sthoulya (Obesity) – A study Protocol

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***Abstract*---**Obesity is a metabolic condition associated with the abnormal accumulation of fat in the body, resulting in multiple adverse effects on health. Generally, it occurs due to an imbalance between the intake of calories and its utilization in the body. Patients with a body mass index (BMI) of more than 25–30 kg/m are considered obese[2]. The prevalence rate of Obesity is 11.8% to 31.3% as per observations of ICMR-INDIAB in 2015. It can be correlated with *Sthoulya*mentionedin *Ayurveda* that occurred due to vitiated *Kapha* and *Meda*. *Sthoulya* is one of the major diseases under *Santarpanottha Vyadhi* (Nutritional Disorders) caused due to *Dushti*of *Medovaha Srotasa*. It is an abnormal and excessive accumulation of

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Meda Dhatu in the body. According to *Acharya Charaka*, *Udvartana* has *Kaphhar* and *Medohar* properties. It is of 2 types, i.e. *Snigdha Udvartana* and *Ruksha Udvartana*. Among them, *Ruksha Udvartana* is used in the management of *Sthoulya*. To evaluate the comparative efficacy of *Rodhradi Gana Udvartana* with *Petiswedana* and *Gomaya* Mashi *Udvartana* with *Petiswedana* in the management of *Sthoulya* (Obesity). A total of 60 patients will be enrolled and divided randomly into two equal groups. In group (Control group), *Udvartana* with *Rodhradi Gana* followed by *Peti Swedana* will be prescribed for 14 days. In group B i. e Interventional group, *Udvartana* with *Gomaya Mashi* followed by *Peti Swedana* will be advised to obese patients for 14 days. Subjective and objective outcomes will be statistically analyzed by appropriate methods. Conclusions will be drawn based on observations and results obtained in this study.

Keyword: Sthoulya, Udvartana, Obesity, Rodhradi Gana, Gomaya Mashi, Petiswedana.

Introduction

The World health organization has defined Obesity as a condition with excessive fat accumulation in the body to the extent that health is adversely affected [1]. It results from a positive energy imbalance expressed by body mass index (BMI) of 25–29.9 and $\geq 30\ kg/m^2$, respectively[2,3]. In 2000, WHO labeled Obesity as the most blatantly visible but most neglected public health problem worldwide [4]. It has become a major public health problem in both developed and developing countries. It is causally related to a wide spectrum of chronic non-communicable diseases, including Type 2 Diabetes, Cardiovascular diseases, and Cancer [5]. Both generalized Obesity and Abdominal Obesity are associated with an increased risk of morbidity and mortality [6]. Moreover, several studies reported Obesity as the well-documented major risk factor for many non-communicable diseases and health conditions, including Hypertension, High Lipid Concentrations, Type-2 Diabetes, Coronary Heart Disease, Stroke, and certain Cancers.[7-11]. According to WHO, in 2016, more than 1.9 billion adults aged 18 years and older were Overweight or Obese [12]. The global burden of Obesity is recorded to be 4 million deaths and 40 million disability-adjusted life years among adults globally in 2015[13]. The prevalence of obesity in urban areas of Maharashtra is 6.6% and 2.2%. The prevalence of obesity in rural areas is 3.4% and 0.6%. The prevalence of Obesity is higher in urban areas as compared to the rural areas. Lack of physical activities, family factors, frequent and overeating habits are important risk factors for this disease [14].

Certain factors e.g.age, gender, geographical variations, socio-economic status, etc., affect the prevalence of Obesity in India. The prevalence rate of central Obesity is 16.9%-36.3%, as per observations of a study conducted by ICMR-INDIAB in 2015. In India, Abdominal Obesity is the most contributing factor for developing cardiovascular complications [15]. Most persons with middle-age suffer from such type of Obesity, but it can occur at any stage of life. Normally, women

are more prone than men [16], but men suffer from this disease at 20-30 years [17].

There are different treatment modalities described by modern science for the management of Obesity like Diet, Exercise, Drug therapy, and Surgery. However, there are certain limitations of pharmacological options due to their certain neurological and psychiatric side effects. Moreover, non –pharmacological modalities like Diet lead to fatty/ oily stool, fecal urgency, and fat-soluble vitamins [18]. So, it is necessary to search for simple but effective treatment modalities in alternative science, i.e., Ayurvedato manages such conditions.

According to *Ayurveda*, Obesity can be correlated with *Sthoulya* that originated from *Kapha* and *MedaDushti. Sthoulya* is one of the major diseases under *SantarpanotthaVyadhi* (Nutritional Disorders) caused due to the Dushti of *MedovahaStrotasa*. It is an abnormal and excessive accumulation of *Meda Dhatu* in the body [19]. *Acharya Charak* considered *Atisthula* as one among *Astonindita Purusha*, [20]*Meda*is increased in the body due to lack of physical exercises, sleeping during the daytime, and consuming food, which increases *Kapha Dosha*, ingestion of excess fats/oils and substances that are predominantly sweet. All the channels that continuously supply nutrients to other tissues are blocked by *Medas* (Fats), so further tissues are not properly formed, and only *Medas* get accumulated. Because of this unequal distribution of fats in the body, the person is called *Sthula.* In *Sthoulya,* the person suffers from mild dyspnoea, thirst, drowsiness, excessive sleep &appetite, the offensive smell from the body, incapability to work and participate in sexual intercourse.

Ayurveda vividly elaborates *the Ayurvedic* line of treatment through various *Shaman* and *ShodhanChikitsa*. Among *Shodhana,* it can be classified based on the route of administration, e.g., external and internal. Among them, *Udvartana*and *Petiswedana* these are *BahyaShodhana* procedures that eliminate Vitiated Dosha through the skin and help melt fat. *Udvartana* has *Kaphhar* and*Medohar* properties. According to *Acharya Charaka*, *Udvartana* is of two types, *SnigdhaUdvartana* and *RukshaUdvartana*. Among them, *Ruksha Udvartana* is used in treating *Sthula* (obese patients), in which dry powder of herbs without oil is generally used for this procedure. The previous clinical evidence shows that many herbal drugs can be used for *Udvartana.* Still, through this study, novel efforts are made to study the comparative efficacy of*Udvartana* with *GomayaMashi,* i.e., cow dung ash powder (Animal product) and herbal powder in the management of Obesity.

Background & rationale

Treatment of Obesity includes Diet therapy, Exercise, and drugs. Peripheral acting weight-reducing drugs possess some adverse effects such as fatty/ oily stool, flatulence, fecal urgency, and deficiency of fat-soluble vitamins. Drug acting over an endocannabinoid system such as Rimonoban has side effects such as multiple Neurological and psychiatric ailments [21]. On the other hand, patients are generally unwilling to undergo surgeries, e.g., bariatric surgery, due to fear. Therefore, alternative treatment options in Ayurveda for the same should be searched due to the above scenario.

In *Ayurvedic* literature regarding the management of *Sthoulya* (Obesity), it is observed that extensive work has been carried out regarding the efficacy of various treatment measures in *Ayurveda*. However, these measures have certain limitations. Among *Panchakarma*, through *Vamana* and *Virechana* offers significant results in weight reduction, many patients have poor compliance rate towards the consumption of medicated ghee before administration of these procedures that is their mandatory criteria. There is a misbelief about the lipid elevating effects of this medicated ghee also. Therefore, obese patients get deprived of their miraculous results.

Moreover, most patients are reluctant and deny to undergo *Vasti (Medicated Vasti*), e.g., *Lekhana Vasti,* due to hesitancy. There is also much apprehension regarding *Vasti* formulations that contain many herbo-mineral combinations that may adversely affect the liver and kidney. Therefore, external treatments are quite popular among society for the management of this clinical condition. *Udavartna,* i.e., dry powder massage, is considered the best therapy for encouraging results in inches loss. On extensive review of Ayurvedic trials, it is found that many studies have been carried out regarding *Sthoulya* (Obesity). Still, research work on *Gomaya Mashiudvartana* in *Sthoulya* (Obesity) and comparative analysis is not done yet.

There are many rural areas and villages in India where cows are kept for milk and dairy product purposes. Thus, the cow dung can easily be procured from such rural areas and villages at a very low cost compared to other herbal drugs, for which one has to search a lot, and the herbal drugs are costly enough for one's reach. Hence, this study is planned to study the comparative efficacy of *Rodhradi Gana Udvartana* with *Petiswedana* and *Gomaya*Mashi *Udvartana* with *Petiswedana* in the management of *Sthoulya* (Obesity).

Aim and Objectives

Aim:

Evaluation of Comparative efficacy of *Rodhradi Gana Udvartana*with *Petiswedana* and *Gomaya Mashi Udvartana* with *Petiswedana* in the management of *Sthoulya* (Obesity).

Objectives:

- To assess & compare the efficacy of *Rodhradi Gana Udvartana* with *Petiswedana* and *Gomaya Mashi Udvartana* with *Petiswedana* over Weight in Kg & B.M.I. in Obesity
- To assess & compare the efficacy of *Rodhradi Gana Udvartana* with *Petiswedana* and *Gomaya Mashi Udvartana* with *Petiswedana* over anthropometric parameters, e.g., Mid arm circumference, abdominal circumference, Mid-thigh circumference, Waist-Hip Ratio, & Skinfold thickness in Obesity.
- To assess & compare the efficacy *Rodhradi Gana Udvartana* with *Petiswedana* and *Gomaya Mashi Udvartana* with *Petiswedana* over biochemical parameters, e.g., Serum Lipid Profile in Obesity

Material and Methods

Type of Study: Interventional Study
Study design: Randomized, single-blind controlled clinical trial
Case definition- Diagnosed case of *Sthoulya* (Obesity)

Diagnostic Criteria:

- Lipid profile (S. Total cholesterol, S.triglycerides, S. HDL, L.D.L,V.L.D.L)
- Fasting Blood Sugar

Research Question: Whether *Gomaya Mashi Udvartana* with *Petiswedana* is more efficacious than the *Rodhradi Gana Udvartana* with *Petiswedana* in managing *Sthoulya* (Obesity)?
Ethics & Dissemination**:** IEC Certificate, obtained vide IEC Ref No. MGACHRC/IEC/July-2021/341 dated 30.07.2021, CTRI registration under process.

Methodology

Study Setting: The study will be conducted in Panchakarma OPD & IPD, Mahatma Gandhi Ayurved college hospital & Research Centre (MGACH&RC), Salod (Hirapur) Wardha, Maharashtra.

Eligibility criteria
Inclusion criteria:

- Subjects between the age group of 20-40 years of either sex
- Patients having B.M.I. of 25 to 39.9 kg/m^2 with or without comorbidity of Obesity as per ICD Criteria for obesity[22]
- Subjects willing to participate in the study and sign the consent form

Exclusion criteria

- Patients having B.M.I. equal or > 40 kg/m^2
- K/c/o Hypothyroidism, Diabetes mellitus, Cardiovascular, Renal Disorder, and Drug-induced Obesity, etc.
- Pregnant lady and Lactating mother.
- Individuals showing unsuitability of Drug or ADR
- Patients not willing to continue due to any reason
- Patient contraindicated for *Udvartana* and *Petiswedana* [23]

Interventions

Group-wise details of intervention in this study are given in table no.1.

- Group A (Control Group): *Rodhradi Gana Udvartana* with *Petiswedana*
- Group B (Trial Group) :*GomayaMashiUdvartana*with*Petiswedana*

Methodology of the study: The methodology of the study is mentioned in Figure no.1.

Criteria for discontinuing or modifying allocated interventions:

- Patients willing to quit in between will be allowed to quit & will be replaced.
- If a patient develops an acute illness during the trial, which may hamper the study.
- Withdrawn patients will be replaced
- If any untoward incidence, features of drug sensitivity, or any other disease or problem arises, the subject will alleviate the problem without taking charge.

Follow up: 16thday of study.

Assessment Criteria

The following Anthropometric assessment will be done before & after the treatment using a weighing machine & measuring tape.

- Body Weight of the patient in kg (Weight will be taken on an empty stomach with the same cloths)
- B.M.I. (calculated by International criteria of B.M.I.)
- Anthropometric Assessment/Body circumference(The girth measurements of certain regions, e.g., Chest- Abdomen – Hip – Mid-thigh –Mid arm using measuring tape before and after the Treatment)
  - ❖ Chest circumference – In normal expansion at the level of nipple
  - ❖ Abdomen circumference – At the level of the umbilicus
  - ❖ Hip circumference – At the level of the highest point of distension of the buttock
  - ❖ Mid-thigh circumference – Mid of the thigh between pelvic and knee joints
  - ❖ Mid arm circumference – Mid of the arm between shoulder joint and elbow joint
  - ❖ Waist-Hip Ratio

    In case of all circumferences, the mean values will be taken before and after treatment.

Biochemical test

Lipid profile (S. Total cholesterol, S. triglycerides, S. HDL, L.D.L, V.L.D.L)

Consent: The written informed consent will be taken from the patient before starting the study. During the study, the confidentiality of each patient will be maintained.

Figure:

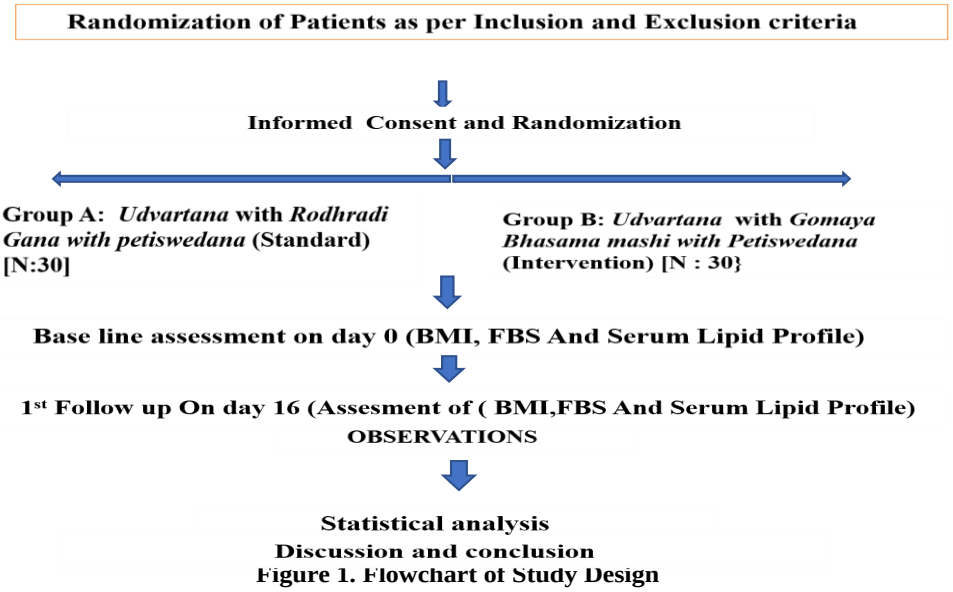

Figure 1. Flowchart of Study Design

Table 1
Group-wise details of Intervention

Group	Sample Size	Intervention	Quantity and Frequency	Duration	Follow up
A	30	*Udvartana* with *Rodhradi Gana* with *Petiswedana*	100 gm Daily once	15 days	0day(baseline)16th day
B	30	*Udvartana* with *Gomaya Mashi* with *Petiswedana*	100 gm Daily once	15 days	0day (baseline)16th day

Result and Observations

Data obtained from baseline & follow-up visits will be used for analysis, and the results will be reflected based on various charts, graphs, and tables. To verify the significance of the results: Reduction in Body Weight by more than 3 Kg, more than 5 cm reduction in Anthropometric measurements & Skinfold thickness (each in cms) after the intervention will be considered significant.

Discussion

Mainly *Kapha-Meda* is a prime pathological factor involved in the pathogenesis of the *Sthoulya*(Obesity). Therefore, drugs exhibiting *Katu-TiktaRasa* (pungent-bitter), *Ushna Virya, LaghuRuksha-TikshnaGunaDravyas*should be mainly used to

induce the *Medovilayana* and pacify *Kapha Dosha*. *Udvartana*is, a type of massage of the body which subsides or normalizes *Kapha*, liquefies, and dissolves excess fat, is helpful for a good structural framework of the musculoskeletal system. It has *Kapha-Medovilayana* property due to the *Veerya*of drug entering the body and opening the *Mukha* of *Siras*, thereby creating *Paka* of *Kapha* and *Meda* [24]. *Udwartana* is one of the readily available, eco-friendly procedures used to strengthen the locomotor system. As *ApatarpanChikitsa* is the most appropriate line of treatment in *Sthoulya* to prevent *Amasanchaya* and *Srotavarodha*, *Twakasta Agni* gets stimulated after applying drugs used for *Udavartana*, which leads to absorption and digestion of these drugs and further does*Pravilayana*of *Medha Dhatu* (liquefaction of subcutaneous fat) below the skin. In *Sthoulya,* there is an increase in *VikrutaMeda Dhatu,* which stimulates the formation of *Kleda*in excess quantity that obstructs circulatory channels, and *AbaddhaMeda Dhatu* (loose fat) is formed. This process may lead to *Dhatvagnimandya* (decreased metabolism of *MedaDhatu*at cellular level).
Medohara property of drug used for *Udvartana* can be justified based on its *Ushna, Tikshna, Laghu* properties. Due to *Rukshaguna* of *Dravya* and *Ruksha Udvartana,* absorption of *Kleda* takes place [25]. Thus, *Abaddhatva* of *Meda* and *Kapha* might be reduced. *Gomaya* is *Kaphashamak*in nature, and it is indicated in mostly *Kapha Dosha PradhanaVyadhi* such as asthma, cough, hiccough, eye disorders, mouth disorders, Obesity, etc [26-28]. Other related studies were reviewed [29-44]. *Gomaya* being *Kaphasamak* and *Medohara*, best serves the purpose of *Samprapti Vighatan* of *Sthoulya*.

Conclusion

Conclusions will be drawn according to the observations based on various assessment parameters obtained in this study.

References

1. D. R. Wagner and V. H. Heyward, “Techniques of body composition assessment: a review of laboratory and field methods,” *Research Quarterly for Exercise and Sport*, vol. 70, no. 2, pp. 135–149, 1999. 2014, Control CfD Prevention. Overweight or obesity: adult obesity facts.
2. E. S. Kasu, A. Ayim, and J. Tampouri, “Assessment health care services among health care workers in holy Karbala governorate,” *Journal of Biology, Agriculture and Healthcare*, vol. 5, 2015.
3. World Health Organization, *Obesity: Preventing and Managing the Global Epidemic*, World Health Organization, Geneva, Switzerland, 2000.
4. J. S. Tabrizi, H. Sadeghi-Bazargani, M. Farahbakhsh, L. Nikniaz, and Z. Nikniaz, “Prevalence and associated factors of prehypertension and hypertension in Iranian population: the lifestyle promotion project (LPP),” *PLoS One*, vol. 11, no. 10, Article ID e0165264, 2016.
5. World Health Organization, *Waist circumference and waist-hip ratio: report of a WHO expert consultation*, World Health Organization, Geneva, Switzerland, 2008.
6. H. B. Hubert, M. Feinleib, P. M. McNamara, and W. P. Castelli, “Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of

participants in the Framingham Heart Study," *Circulation*, vol. 67, no. 5, pp. 968–977, 1983.
7. E. E. Calle, C. Rodriguez, K. Walker-Thurmond, and M. J. Thun, "Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. Adults," *New England Journal of Medicine*, vol. 348, no. 17, pp. 1625–1638, 2003.
8. A. Molarius and J. Seidell, "Selection of anthropometric indicators for classification of abdominal fatness- a critical review," *International Journal of Obesity*, vol. 22, no. 8, pp. 719–727, 1998.
9. C. Kragelund and T. Omland, "A farewell to body-mass index?" *The Lancet*, vol. 366, no. 9497, pp. 1589–1591, 2005.
10. J. R. Sowers, "Obesity as a cardiovascular risk factor," *The American Journal of Medicine*, vol. 115, no. 8, pp. 37–41, 2003.
11. World Health Organization, 2018, http://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.
12. G. B. D. O. Collaborators, A. Afshin, M. H. Forouzanfar, et al., "Health effects of overweight or obesity in 195 countries over 25 years," *The New England Journal of Medicine*, vol. 377, no. 1, pp. 13–27, 2017.
13. Minhajuddin Ahmed, Kuldeep Shah, Vinayak YadavraoKshirsagar, Prevalence and risk factor for Obesity in urban and rural school going children of Karad taluka, Maharashtra, India, 2016
14. Rajeev Ahirwar, Prakash Ranjan Mondal–Prevalence of Obesity in India: A systematic review, 2018.
15. Textbook of Medicine by Dr. S.N. Chugh- Aetiology of Obesity
16. C. G. Victora, L. Adair, C. Fall, et al., "Maternal and child undernutrition: consequences for adult health and human capital," *The Lancet*, vol. 371, no. 9609, pp. 340–357, 2008.
17. Manual of Practical Medicine by R. Alagappan, Management of Obesity.
18. Srikantha Murthy K.R., Bhavprakasha of Bhavmishra, Chawkhamba Krishnadas Acadamy Varanasi,5th edition reprint 2015 Vol.2, Madhyam Khanda chapter-39, shloka 1-5, pg.502
19. Srikantha Murthy K.R., Bhavprakasha of Bhavmishra, Chawkhamba Krishnadas Acadamy Varanasi,5th edition reprint 2015 Vol.2, Madhyam Khanda chapter-39, shloka 1-5, pg.502
20. Textbook of Medicine by Dr. S.N. Chugh- Chapter-2, Balanced Diet, and Nutritional disorders, Unit-9, Obesity
21. 2021 ICD-1- CM Diagnosis Codes E66.
22. Modalities for Massage and Bodywork - E-Book, Chapter-2, Ayurvedic Therapies.
23. Sushruta samhita, kaviraj ambikadatta shashtri, chaukhamba Sanskrit sansthan, edition- 2007, chikitsa sthan, chap- 25, page no-108, shloka- 51-54
24. Yogaratnakara, acharya Siddhinandan Mishra, Chaukhabaorientalia-Varanasi, edition- 2020 chap no: 1, page no: 68, shloka-545.
25. Parwe S, Ashtankar P, Bhagwat P, Nisargandha M. Study the Efficacy of Rodhradigana Vasti in the Management of Sthaulya (Overweight). Journal Of Pharmaceutical Research International. 2021; 33(34B):158–66.
26. Parwe S, Mohan M, Bhagwat P, Nisargandha M. Effect of Rodhradi Gana Udavartana in the Management of Sthaulya (Overweight) with Special

Reference to Obesity. International Journal Of Life Science And Pharma Research. 2021 May; 11(3):L30–7.
27. Bhonsle A, Parwe S, Nisargandha M. A Comparative Study to Evaluate the Efficacy of Lekhana Basti and Modified Vachadi Gana Basti in Combination with Navaka Guggulu in Sthaulya (Obesity) -A Study Protocol. Journal Of Pharmaceutical Research International. 2021; 33(30A):154–61.
28. Garg, Mayank, and Sandip Mohale. "Prevalence of Metabolic Obesity Normal Weight (MONW) in Cardiovascular Disease Patients - A Hospital-Based Case Control Study." Journal Of Evolution Of Medical And Dental Sciences-Jemds 9, no. 34 (August 24, 2020): 2427–31. https://doi.org/10.14260/jemds/2020/528.
29. Hulkoti, Vidyashree S., Sourya Acharya, Samarth Shukla, Sree Karthik Partapa, and Yash Gupte. "In Search of an Ideal Obesity Assessment Tool : Is Body Mass Index Reliable Enough?" JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 35 (August 31, 2020): 2556–60. https://doi.org/10.14260/jemds/2020/555.
30. Rasheed, Aamil, Sourya Acharya, Samarth Shukla, Sunil Kumar, Roopesh Yarappa, Yash Gupte, and Vidyashree Hulkoti. "High-Sensitivity C-Reactive Protein in Metabolic Healthy Obesity (MHO)." JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS 9, no. 7 (February 17, 2020): 443–47. https://doi.org/10.14260/jemds/2020/100.
31. Dhar R, Singh S, Talwar D, Mohan M, Tripathi SK, Swarnakar R, Trivedi S, Rajagopala S, D'Souza G, Padmanabhan A, Baburao A. Bronchiectasis in India: results from the European multicentre bronchiectasis audit and research collaboration (EMBARC) and respiratory research network of India registry. The Lancet Global Health. 2019 Sep 1;7(9):e1269-79.
32. Pradhan S, Madke B, Kabra P, Singh AL. Anti-inflammatory and immunomodulatory effects of antibiotics and their use in dermatology. Indian journal of dermatology. 2016 Sep; 61(5):469.
33. Acharya S, Shukla S, Mahajan SN, Diwan SK. Acute dengue myositis with rhabdomyolysis and acute renal failure. Annals of Indian Academy of Neurology. 2010 Jul; 13(3):221.
34. Gadbail AR, Chaudhary M, Patil S, Gawande M. Actual Proliferating Index and p53 protein expression as prognostic marker in odontogenic cysts. Oral Diseases. 2009 Oct; 15(7):490-8.
35. Prasad N, Bhatt M, Agarwal SK, Kohli HS, Gopalakrishnan N, Fernando E, Sahay M, Rajapurkar M, Chowdhary AR, Rathi M, Jeloka T. The adverse effect of COVID pandemic on the care of patients with kidney diseases in India. Kidney international reports. 2020 Sep 1; 5(9):1545-50.
36. Walia IS, Borle RM, Mehendiratta D, Yadav AO. Microbiology and antibiotic sensitivity of head and neck space infections of odontogenic origin. Journal of maxillofacial and oral surgery. 2014 Mar 1; 13(1):16-21.
37. Lohe VK, Degwekar SS, Bhowate RR, Kadu RP, Dangore SB. Evaluation of correlation of serum lipid profile in patients with oral cancer and precancer and its association with tobacco abuse. Journal of oral pathology & medicine. 2010 Feb; 39(2):141-8.
38. Korde S, Sridharan G, Gadbail A, Poornima V. Nitric oxide and oral cancer: A review. Oral oncology. 2012 Jun 1; 48(6):475-83.

39. Gondivkar SM, Gadbail AR. Gorham-Stout syndrome: a rare clinical entity and review of literature. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2010 Feb 1; 109(2):e41-8.
40. Gadbail AR, Chaudhary M, Gawande M, Hande A, Sarode S, Tekade SA, Korde S, Zade P, Bhowate R, Borle R, Patil S. Oral squamous cell carcinoma in the background of oral submucous fibrosis is a distinct clinicopathological entity with better prognosis. Journal of Oral Pathology & Medicine. 2017 Jul; 46(6):448-53.
41. Gadre PK, Ramanojam S, Patankar A, Gadre KS. Nonvascularized bone grafting for mandibular reconstruction: myth or reality?. Journal of Craniofacial Surgery. 2011 Sep 1; 22(5):1727-35.
42. Sorte K, Sune P, Bhake A, Shivkumar VB, Gangane N, Basak A. Quantitative assessment of DNA damage directly in lens epithelial cells from senile cataract patients. Molecular vision. 2011;17:1.
43. Basak S, Rajurkar MN, Mallick SK. Detection of Blastocystis hominis: a controversial human pathogen. Parasitology research. 2014 Jan; 113(1):261-5.