



Welfare of Elephant Gowri in Malur Care Centre

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Introduction

Welfare of animals can be defined by the assessment of their physical and psychological (mental) health status. If an animal is given the opportunity to live in its natural habitat, it will take care of its psychological and mental health. Living with a social group in a natural environment offers and also dictates its physical and mental health activities (Bradshaw, 2008). It is well known that the physical and psychological health status of captive elephants could be measured in terms of normative behavior, i.e. whether to play, feed or sleep or seek refuge from danger, etc. Each instance is governed by the complex interaction of the brain and genetic make-up of the individual in conjunction with cues from conspecifics (Irie and Hasegawa, 2009). The *individual* is the decision-maker here and some species-specific behaviours serve as indicators for physical and mental health status.

Captivity relies on providing an un-natural setting such as the presence of humans, absence of other conspecifics (social isolation), man-made housing with no vegetation, no opportunity for an elephant to express itself in a way that can be *understood* by another, and all aspects of its behavior controlled by human figures. The individual undergoes stress and is unable to express itself in a species-specific context-dependent manner (Varma and Prasad, 2008). One way of rehabilitating and ensuring physical and mental activities for animals in captivity is by providing a near natural environment along with different individuals to interact with. If an animal is exposed to a large quantity of unnatural food, it will become obese and is expected to have diabetes-related health issues, along with chronic infections and arthritis. If an animal is suffering from the above-mentioned health issues, one way to slowly but effectively treat or solve these issues is by providing natural or semi natural conditions along with another animal of the same species to interact with.

Gowri (aka Kalpana) is a 41-year-old female Asian elephant maintained by Sri Kanteshwara temple in Najangudu, Mysore; the elephant was taken from a forest camp in Thithimathi at the age of 8 years to perform temple-related duties. She was shifted to a rescue center in Malur in March 2017 to help with weight issues, chronic foot problems, chronic infection in her tusks and diabetes-related health problems. Gowri is an elephant who portrays the classical example of the above mentioned physical and psychological health issues. Once an elephant like Gowri is rehabilitated, it is important to know the recovery status. This can be achieved by assessing many physical and psychological health indicators. Gowri in her previous location at Nanjangudu, expressed many stereotypical patterns of a captive elephant. She had a fixed routine without any meaningful activity. She was mostly chained and given a large quantity of unnatural food. As she was not exposed to any other activity, introducing her to natural habitats was very difficult. Standing and eating caused her weight to increase and she refused to accept any recovery processes including going for walks. This exacerbated her diabetes, arthritis, and chronic infections.

One may not have the details of Gowri's life in the previous location (temple) but observing her at her current location may give some insights. As we know, a sedentary life could lead to physical and psychological health issues. Therefore, we observed her in her current location for her day-

to-day activities through the use of a time-activity budget. If Gowri is active, it will be useful to map her activities since it gives an opportunity to understand her mental health status. This report is an attempt at assessing Gowri's welfare through observations of behaviour expressed by the elephant as an indication of her psychological state. Mental health can be defined as the functioning of the mind that helps accomplish regular, even minor day to day activities efficiently, with the help of traits like curiosity, alertness, self-care etc. along with the help of memory that stores required information aiding self-preservation (Hetts, et al., 1991). If an animal is not healthy mentally, it would not guarantee an improvement in physical health, as the animal would not tend to itself in any manner. *Thus, mental health is really the key to overall health.*

Assessment of current physical and mental health status was made through this investigation and the following two distinct approaches were used:

1. Observing and recording Gowri's activity patterns
2. Observing mental health indicators, such as circumpolar navigation (stealing, mischievousness) being aware of her needs, showing interest towards interacting with another elephant, being aware of surroundings, showing interest or curiosity towards things that are unknown or to which she is exposed for the first time, and other types of behaviours.

Methods

For this investigation, a welfare assessment team was formed and the team was guided by an elephant expert. The team collected various details of her body measurements, feeding, behavior and her interaction with Aneesha, another captive elephant who is her current companion.

Observation of elephant-elephant interactions:

- Alternate 2-hour slots were picked up throughout the day for observation (e.g.: 06:00-08:00, 10:00-12:00, 14:00-16:00, and 18:00-20:00).
- Within each observational period, Gowri's activities were observed and recorded for a period of 10 minutes, followed by a 5-minute break where no observations or recordings were made. This cycle was repeated for the entire 2 hours.
- As part of observations, the distance between the elephants were recorded at the start and subsequently every time the distance between them changed.

In addition to this, Gowri's health records and treatment regimens were reviewed, and her interaction with the mahouts was investigated. Exclusive observations of her time activity and mental health indicators were also made.

Mental well-being of non-human animals is difficult to measure but not impossible; among the various ways in which this can be done is to observe behavioural features of the animal. Hetts et al., (1991) explain different ways in which behavior expressed by animals can be used to infer their mental well-being. *Mental well-being can thus be inferred by observing for occurrence of*

abnormal behaviours such as stereotypies, expression of conflict behaviours and expression of species-typical behaviours.

For instance, when an elephant is socially isolated, the need to touch and gather information about its companions does not arise— one extreme example is of an elephant trying to touch a stone statue of an elephant it chanced upon. Expression of species-typical behaviours in the context observed among wild conspecifics could provide an indicator to the captive animal's psychological framework. Similarly, abnormal behaviours indicate aberrations experienced by the animal.

Results:

Welfare status of the elephant was assessed twice— in 2005 and in 2013— when it was maintained in Nanjangudu by the temple authorities. Both assessments showed deviations from natural conditions of more than 50% (Belagere, et al., 2013).

Both the surveys showed that the elephant was maintained in a shed exposed to stone flooring (Figures 1,2,3 and 4), chained by front and hind leg, provided little exercise opportunity and kept in social isolation. The elephant was overweight, was treated for chronic foot problems and tush infection. In 2017, she was shifted to WRRC at Malur to help with chronic issues of tooth infection and excess weight.



Figures 1,2 3 and 4: Elephant Gowri at her earlier location



Profile of the care centre:

The elephant care facility is located at Malur, approximately one and a half hours away from Bangalore City. It is spread over two acres, surrounded by agricultural fields, adjoining a “chikkoo” (*Manilkarazapota*) orchard (commonly known as *sapota*) and other small groves of trees (see appendix b for scientific names). The facility does not have any roads nearby; hence the place is extremely peaceful with no sounds of traffic and minimal noise levels. No visitors are permitted to the facility. The facility consists of spacious open sheds, one of which is surrounded by a protective I-beam enclosure, that enable the elephants to be kept free of chains at all times. These structures have built-in water tanks, enabling the elephants to access water at will, during day or night.

Mahout quarters are built close to the elephant sheds, but out of their movement path. A large tank for their bathing and soaking has been constructed, where the elephants can play and be submerged in water if they wish. There are two borewells on the premises and a water tank filter which provides clean drinking water to the villagers. The runoff water is aligned to fill the bathing pool and once the used tank water is dirty, it is pumped to irrigate the grass fields, which grows fresh green grass for the elephants. The whole center is surrounded by a solar fence for safety and protection (Figures 5,6,7 and 8). Fresh sand is brought in regularly for the elephants' sleeping quarters. Since Gowri has arthritis, protection from the cold winds at night is provided.



Figures 5,6,7 and 8: Facilities provided to elephant Gowri and current location

Profile of Gowri:

Name	Kalpana (Gowri)
Age (in yrs)	41
Tush	Visible
Current Location	Elephant Care Centre, Malur
State	Karnataka
Previous Location in	Nanjangudu, Karnataka
Source	Purchased in 1987; at Thithimathi Camp
Age when purchased (in yrs.)	8
Age when rehabilitated to WRRC	40
Reason for Rehabilitation	Health issues
Type of shelter at WRRC	Open & closed
Type of flooring at WRRC	Mud & Concrete
Source of water	Tanks
Source of food	Stall fed
Type of food	Ragi, horse gram, jaggery, grasses, banana stems, leaves, sugarcane, vegetables & fruits (detailed list in Appendix II)
Disease	Obesity, chronic toothinfection
Veterinary doctor availability	Yes
Number of Mahouts changed	None

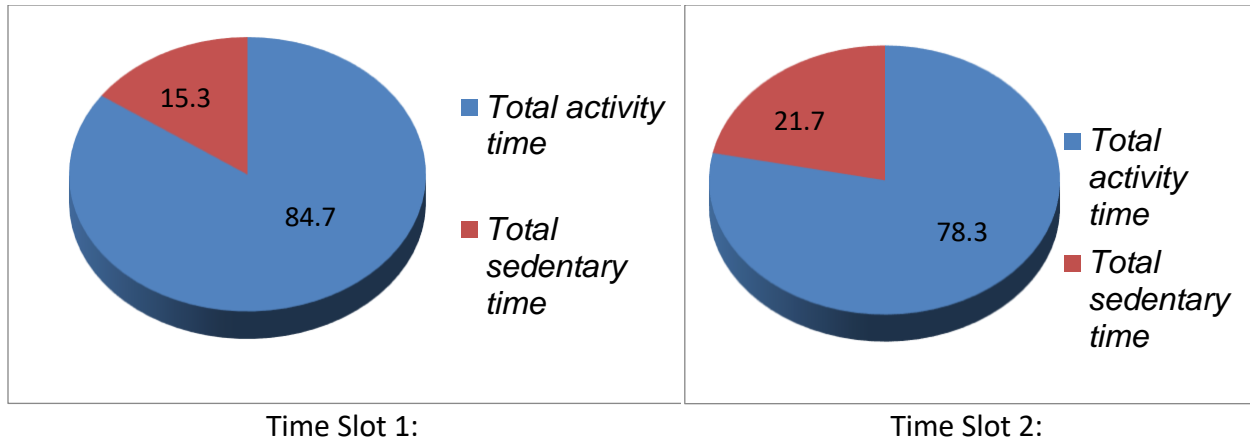
Daily routine:

Between 7 and 8 am, after eating vegetables and fruits, Gowri goes for a walk with her mahout for almost an hour. From 8.30 to-9.30 am, she is given a bath and scrubbed thoroughly using a plastic brush with a wooden handle. After the bath, she is left free inside the I-beam enclosure with Aneesha and both communicate and interact with each other. Often, she sprays herself with dust from a dust mound made specifically for this purpose. Often, when the weather is hot, she sprays herself with water from the tank.

At 5pm, both elephants are left out of the enclosure to graze outside and Gowri is taken for a half hour walk along the natural earth pathways outside the facility. Her attachment to Aneesha makes her very unwilling to be separated, hence care is taken not to separate them for long periods. Separation anxiety is displayed by extreme distress, trumpeting, banging railings with her trunk and uncertain behaviour with humans.

Time Activity Budget

To study the consistency or inconsistency of the results, the elephant was observed in different days and different time slots. The following pie charts show the proportion of time spent being active and the time spent being sedentary. The results are biased towards her being active (85% and 78 % in different times of the observations (Figures 9 and 10).



Figures 9 and 10: Activity pattern of elephant Gowri at Malur Care Centre

A high proportion of time being active signifies that Gowri is getting a superior quality of exercise. In a temple setup this would be difficult because of less space as a result of being tied most of the time, making the opportunities for these activities rare. Defining stereotypy as an act with no observable goal— the elephant swayed her head from side to side on seeing dogs; this was recorded twice during the observation period to give a frequency of 0.02.

This behavior along with head banging against the railing stopped when the dogs moved away. Significantly, Gowri appeared to be comforted by Aneesha (Figures 11 and 12): Aneesha vocalizes and taps on railings with her trunk, and both extend and touch each other with trunk, vocalizing.

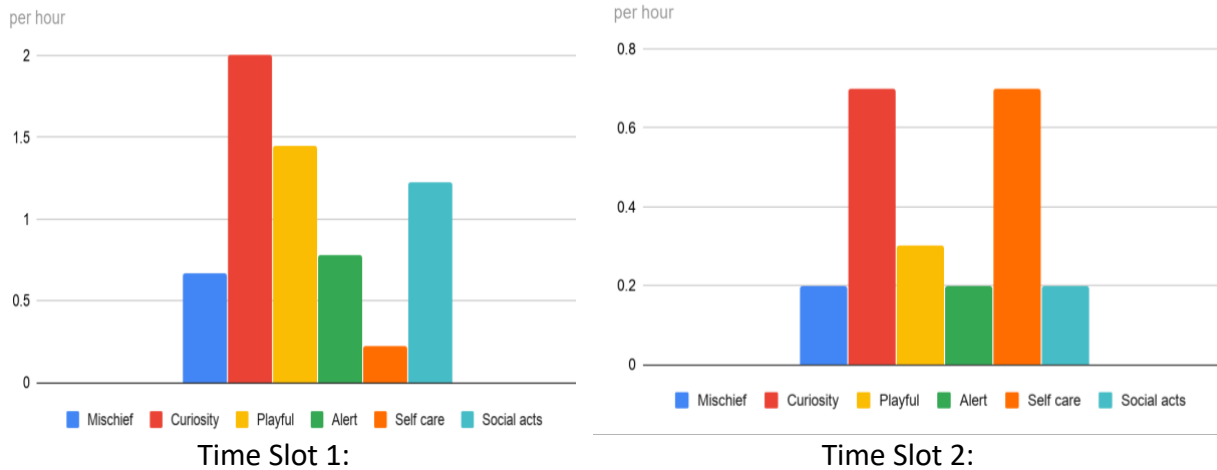


Figure 11 and 12: Social interaction of Gowri with elephant Aneesha

Mental health:

The figures (13 and 14) show frequency of various activities performed by Gowri over the course of a day. The activities have been divided into categories, each of which showcases a different aspect of stable mental health. The relationship between these types of activities and mental

health is described in appendix A. The graph below appears to exhibit the healthy mental state of Gowri. Mental state would have been influenced by improvements in body measurements enhancing her physical health.



Figures 13 and 14: Signals of mental health activities

Gowri and Aneesha express species and contextually appropriate behavior in the form of tactile and vocal communication, showing social bonding between the two. When in distress, such as swaying and banging expressed by Gowri, Aneesha vocalized and reached her trunk towards Gowri. This appeared to calm Gowri and she stopped her behavior and continued to feed when the stressor (sight of dogs) moved away.

Body measurements:

The figure 15 gives comparative body measurement of the elephant when at the temple and at WRRC.

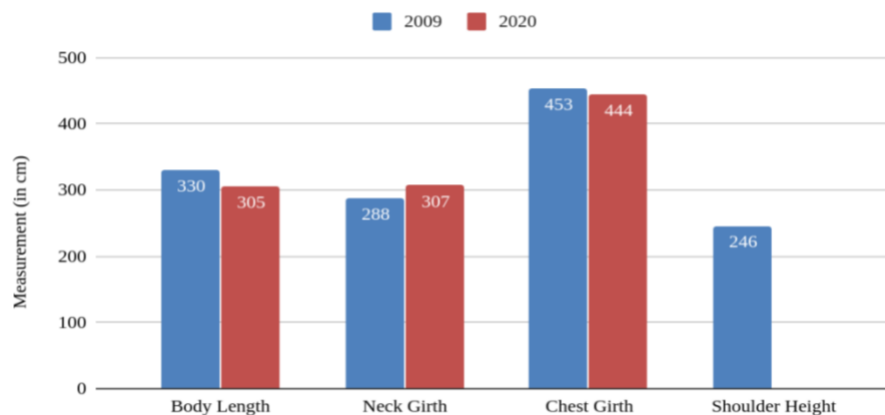


Figure 15: Body measurements of elephant Gowri from different time period

Using chest girth to estimate weight (Chapman, et al., 2016), the elephant appears to have reduced from 4200-5000kgs in 2009 to 4000-4900kgs in 2020.

Feeding, other activities and nutrient intake

Gowri is given 15 different food items

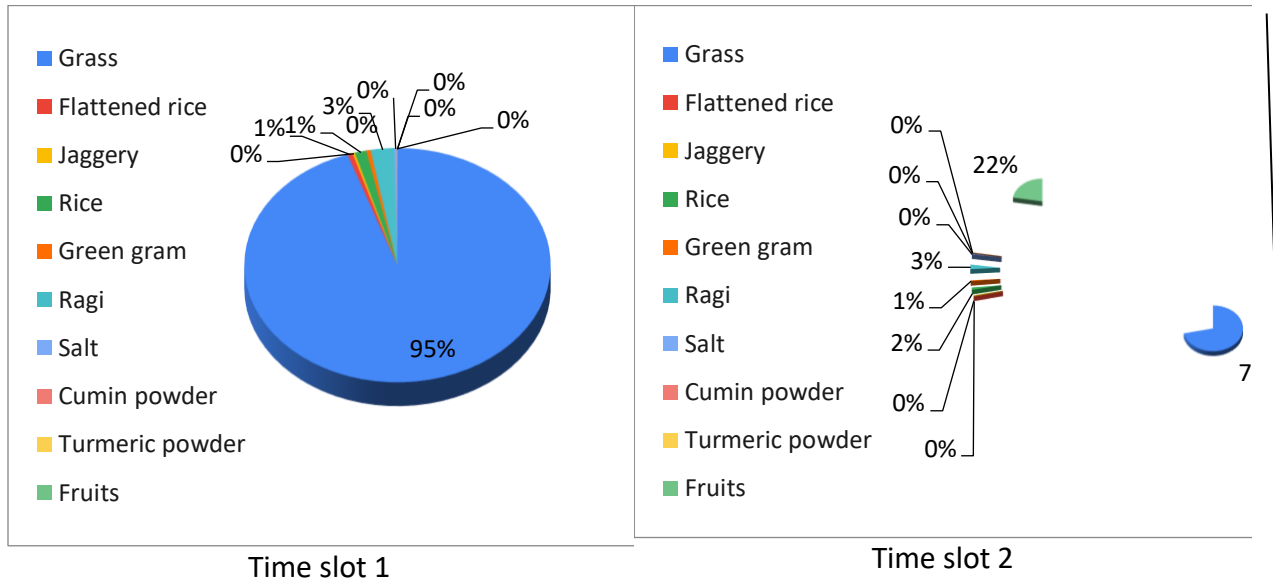
Table 1: Food items and calorie count provided to elephant Gowri

Food items	%	Kg	Food wastage (Kg)	Dry Weight (Kg)	Calories intake
Muskmelon	0.3	0.45			151.3
Beetroot	0.6	1.08			462.3
Guava	0.6	1.05			714.0
Cucumber	0.6	1.00			149.3
Papaya	0.8	1.35			580.5
Sweet Corn	0.1	0.14			58.1
Moong Dal	0.6	1.00			1735.0
Flattened Rice (poha)	1.5	2.50			4925.0
Ragi Powder	3.0	5.00			8000.0
Jeera	0.1	0.10			187.5
Pepper	0.1	0.10			125.5
Salt	0.1	0.25			
Turmeric Powder	0.1	0.10			156.0
Cooked Ration	8.3	14.00			
Napier Grass (Multi-cutter)	83.3	140.00	5.32	13.50	46471.5
Total		168.10			63,715.9

Grass contributed 83% to Gowri's diet, followed by cooked ration (8%), ragi or *finger millet* (3%), broken rice (2%), and the remaining 11 items contributing 4%. Altogether, Gowri consumes 63,716 Calories. Grass (*Pennisetum purpureum*), ragi powder (*Eleusine coracana*), broken rice (*Oryza sativa*), moong dal (*Vigna radiata*) and some of the fruits contribute substantially to her calorie intake.

Every morning, between 7.30 and 8 am, Gowri is given a combination of mixed fruits and vegetables which include guava (*Psidium guajava*), musk melon (*Cucumis melo*), papaya (*Carica papaya*), beetroot and corn (*Zea mays*), amounting to a total of 5kg per day. Between 10.30 and 11.30, Gowri is fed cooked rations, called "ragi mudde", containing green moong dal (*Vigna radiata*), broken rice (*Oryza sativa*), ragi powder (*Eleusine coracana*), jeera (*Cuminum cyminum*), pepper (*Piper nigrum*), salt and turmeric powder (*Curcuma longa*). Gowri is being fed 13-15 kgs of rations, based on the veterinarian's advice.

From 7a.m. to 7 a.m. the next day (24-hour cycle), she was given approximately 150 kgs of Napier Grass in combination with banana stems and, occasionally, coconut leaves. When available, jackfruit, banyan, and bamboo leaves are also given for a change in diet. Direct observations of her food intake were made for different occasions, and times and results of different observations for different days are given in the figures 16 and 17. On both occasions grass dominated— one time at 95% and another at 71%, with fruits accounting for 22 % (Figures 16, 17, 18, 19, 20, 21 and 22).





Figures 16, 17, 18, 19, 20, 21 and 22: Food items given to Elephant Gowri
 Gowri's feeding activity per time extended to an average of 89 minutes. Frequency occurrences of different behaviours are given in figure 23. Feeding was associated with 9 different behaviours; putting food in mount dominated (40%) followed by rolling food with trunk (36%). Stepping on the food, pulling and tearing the branches are other activities associated with feeding that were observed. For a small percentage of time, swaying and banging head on railing was also noticed. The total frequency of observations was 139. Considering the act of putting grass into mouth as feeding, feeding was recorded 99 times — showing a frequency of 0.71 (Figure 23).

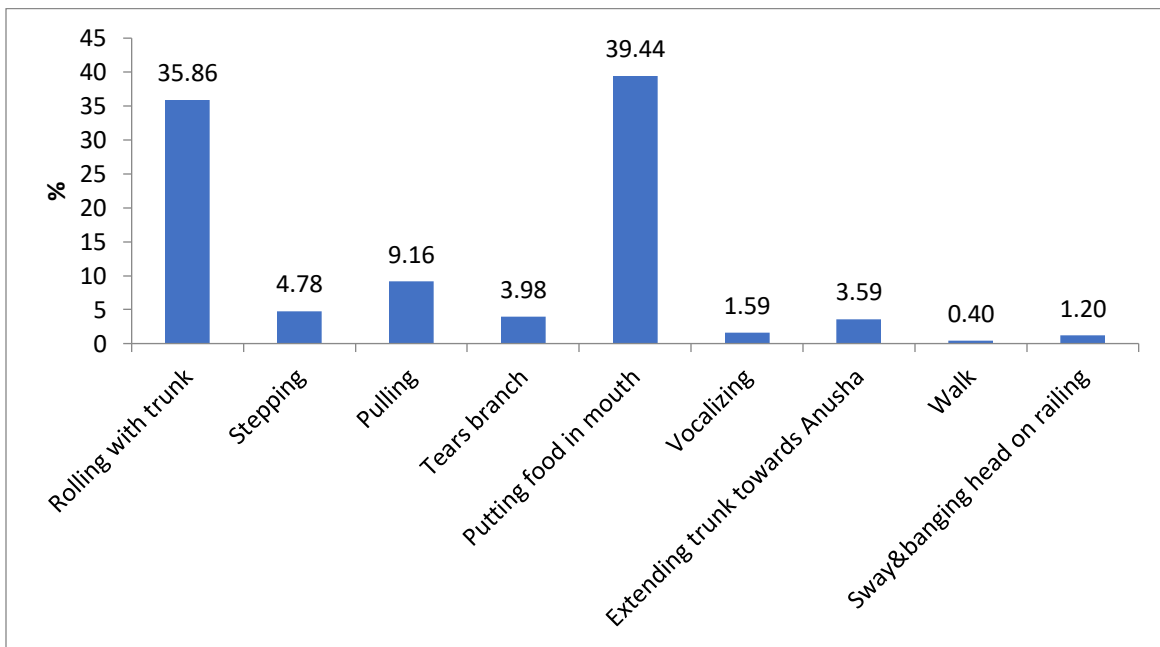
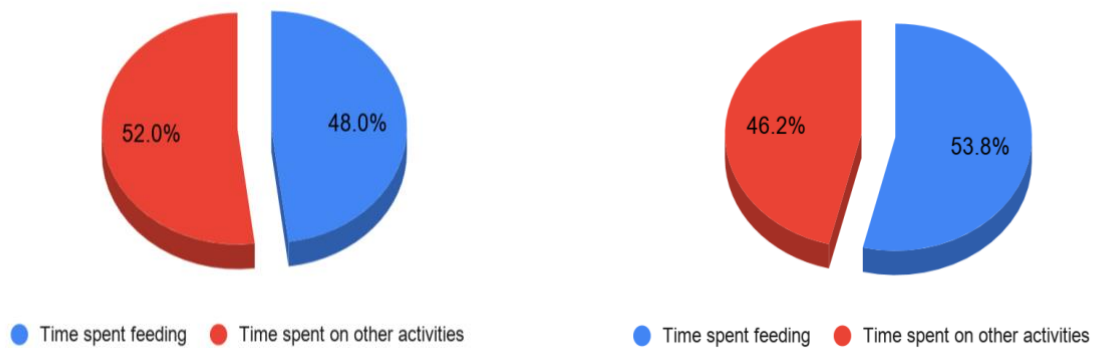


Figure 23: Activities related to feeding of elephant Gowri

Time spent feeding in relation to other activities indicates that other activities also equally dominate and Gowri's activities are not restricted only to feeding (Figures 24 and 25).



Figures 24 and 25: Percentage of time spent for feeding and other activities by elephant Gowri.

Non feeding activities:

A non-feeding activity is any activity which does not involve picking up some form of food with the trunk, putting it into the mouth and then chewing it. Below is a list of all non-feeding activities:

- Standing still
- Moving from one point to another
- Staring at something/someone
- Defecating/urinating
- Physically interacting with Aneesha: touching Aneesha's face with her trunk, embracing trunks with Aneesha
- Throwing mud on self
- Throwing/swinging/kicking a tyre
- Resting her trunk on the barrier
- Tapping/hitting the barrier
- Raising trunk and pointing it in different directions (at ground/in the air)
- Getting alerted (growling/blowing/trumpeting) by disturbances (dogs/Aneesha/people)

Nutrient profile

Green grass is a source of potassium, dietary fiber, vitamin A, vitamin C, vitamin E (alpha tocopherol), vitamin K, thiamin, riboflavin, niacin, vitamin B6, pantothenic acid, iron, zinc, copper, manganese, and selenium. It is also one of the sources of protein. Flattened rice contains carbohydrates at 77 grams per 100 grams, 7 grams protein, 1 gram fat, and 3.5 grams dietary fiber.

Jaggery is rich in iron and also contains many minerals such as magnesium, potassium, calcium, selenium, manganese and zinc. Rice has nutrients such as carbohydrates, calcium, iron, thiamin, pantothenic acid, folate and vitamin E. Green gram provides a variety of vitamins, including pantothenic acid, vitamin A, vitamin K, niacin and vitamin B-6. Ragi or finger millet contains about 5–8% protein, 1–2% ether extractives, 65–75% carbohydrates, 15–20% dietary fiber and 2.5–

3.5% minerals. Finger millet has the highest amount of calcium and potassium. Salt is a primary source of sodium and plays a key role in muscle contraction, nerve conduction and water balance in the body.

Cumin seed or jeera, contains antioxidants, calcium, iron, and magnesium. Turmeric has many health benefits; it can prevent heart disease, is a potent anti-inflammatory and antioxidant, and may also help improve symptoms of depression and arthritis

Veterinary Care

A veterinary doctor is available to look after Gowri. She has been advised medications (Table 2 for details) and a diet plan to suit her current health condition. Medical Records maintained by the Nanjangud Temple was very fragmented. It also revealed that a wide variety of antibiotics were given to the elephant in quick succession, without any continuity. As a result, today Gowri is immune to certain antibiotics which was established after a culture test done for the treatment of her infected tushes.

Gowri has elevated sugar and creatinine levels, which need to be monitored closely. Gowri's tushes (tusks) are cleaned everyday with NS (Normal Saline, i.e. medicated saline fluid) and clove oil . Once a month, her foot pads and nails are trimmed and overgrown cuticles are cut. Recurring fungal infections on her foot are treated with warm water medicated soaks and anti-fungal ointments. Blood is tested every six months to monitor sugar and creatinine levels.

Table 2: Elephant Gowri medication

Medication	Dosage	Composition	Purpose
NaCl Solution, sprayed onto teeth	375mL (approx.)	0.9% NaCl	Disinfectant
Spirit put on cotton and rubbed on the abscess at the base of her tusk	-	0.5% methyl salicylate 2% diethyl phthalate 2.5% castor oil 95% methylated spirit	Disinfectant
Clove oil put on cotton and placed at the abscess	-	-	Anesthetic and known to kill various oral bacteria. Also has anti-fungal properties

Discussion:

Asian elephants have large brain size, approximately 5 kgs. Bates et al., (2008) suggest large brain size in elephants may have evolved as a means of coping with a complex social structure. The cortex and the limbic region of the brain control emotions, maternal behavior, play, etc., and is found in all vertebrates. Another feature— the Encephalization Quotient (EQ) of elephants is comparable to that of primates (Irie and Hasegawa, 2009); this measures the ratio of the cortex to body size. Cerebral cortex is associated with the organism's ability to process its changing environment through memory, perception and visual/vocal/tactile cues.

Modes of communication (tactile/auditory/vocal/olfactory) used by free-living elephants are not available for captive elephants as the living environment may not provide an opportunity to express the same. Among all these modes, the importance of tactile communication cannot be overemphasized. From birth of the calf to its adulthood and sexual maturity, all life-stages are governed by interacting through touch. It is the trunk that acts as an interface between the elephant and the outside world as far as touch is concerned. In captivity, occurrence of single elephants does not provide this opportunity. The only form of tactile communication allowed is “blessing” devotees or the general public, a behaviour taught by the mahout to engage an audience. Captive situations that allow its elephants to express different modes of communication without hindrance will provide improved welfare for its elephants.

In places like temples, elephants are forced to carry out activities unnatural to their daily activities and then isolated the next day. As a result of boredom, and lack of stimulation or enrichment, they oversleep, overeat, and show severe signs of frustration and mental instability. Mental Health of any given species is defined as the collective emotional, psychological, and social well-being. Mental Health directly alters behavioural patterns when an animal is not allowed to live in accordance with its making, which negatively impacts their overall health.

In the temple, Gowri was mostly fed temple food and contributions from devotees which are mostly sugar related, with bare consideration for the elephant's health and nutrition. This has resulted in her becoming over-weight. Being tied to a pole all day with no interaction with her kind has resulted in physical and behavioural issues.

She was rehabilitated to Wildlife Rescue and Rehabilitation Centre (WRRC), Malur in 2017, especially because of her obesity and chronic tooth infection. Her diet was changed to include more nutritious food such as ragi (finger millets) and green moong dal, along with more fibrous foods like grass and banana stems. She also has more space to move around in the camp compared to the space in the temple. Apart from these improvements in her lifestyle, she constantly has more opportunities to improve her mental health. Mental health is an important aspect of her holistic development. This report elaborates on the indicators for improving mental health.

This investigation found the life of Elephant Gowri to be different from her life in the previous location. Our observations found Gowri to be curious, looking at everything presented before her. For example, she walks fast when close to a group of dogs passing by the fence, and steals

food from Aneesha's pile and eats it. She takes mud and water to splash over herself and explores her environment for suitable feed. These are indicators of good health, as factors like curiosity, stealing and self-care are associated with a healthy state of mind. The way to having good mental health is, having opportunities that provide positive use of mental faculties. In Gowri's case, she has the opportunity to play (with mud and water, while being chain free in a vast space), to steal (food from another elephant's pile) and explore her surroundings, to name a few.

Her mental well-being seems to be closely linked to Aneesha's. She is extremely caring, protective and empathetic towards Aneesha. A slight tap/call from Aneesha, and Gowri heads back, which gives her reason to avoid her evening walks. The presence of elephant Aneesha in the care centre provides the opportunity for her to indulge in species-specific social interactions, allowing her to expose herself to different activities and develop cognitive abilities.

A high proportion of time being active signifies that Gowri is getting a superior quality of exercise. In a temple setup this would be difficult because due to lack of space, being tied most of the time, making the opportunities available for these activities rare. Her activities have been divided into categories, each of which showcases a different aspect of stable mental health. Comparison of her body measurements across different times suggests that her body weight has reduced from 4200-5000kgs in 2009 to 4000-4900kgs in 2020.

Gowri is given 11 different kinds of food items. Through this food, she is exposed to different types of macro and micro nutrients, minerals and vitamins. Macro nutrients such as protein, carbohydrate and fat are derived from the different food items currently given to her. Her current source of food indicates a supply of potassium, dietary fiber, vitamin A, vitamin C, vitamin E (alpha tocopherol), vitamin K, thiamin, riboflavin, niacin, vitamin B6, pantothenic acid, iron, zinc, copper, manganese, and selenium, calcium, sodium, antioxidants and anti-inflammatory agents. These food items, in addition to providing required nutrients, also have the potential to prevent many diseases including heart disease, and are known help improve symptoms of depression and arthritis.

The presence of a regular and consistent veterinary doctor helps in diagnosing her health issues, allows us to keep track of her progress, and therefore in formulating an adaptive diet plan. The mahouts have been trained to assist the doctor in providing veterinary care and noting changes in her behavior or diet preferences. As previously mentioned, Gowri has elevated sugar and creatinine levels which need to be monitored closely. This may not be possible in a temple set-up and the authorities need to understand that ill-health of an elephant can lead to mental instability, and that public lives can be put at risk if she is brought back to the temple conditions where she is exposed to a large number of people.

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Appendix A

- Mischief
 - When Gowri performs an act of mischief, it means she is making an attempt to get something that she wants.
 - This shows that she has preferences towards certain things and is able to identify those things.
- Stealing
 - Stealing items which are meant for her indicate a level of circumpolar navigation.
- Curiosity (exploratory behavior)
 - Performing acts that show a sense of curiosity indicates an interest towards things that are unknown or not understood.
 - Hence, she is able to remember certain things and is aware of what she knows and doesn't know.
- Playful
 - Playing is an act of self-enrichment, heightening one's own mental state.
 - By performing playful acts, Gowri shows that she is aware of what makes her feel good and actively attempts to feel good by performing these playful acts.
- Alert
 - Alertness indicates an awareness of one's surroundings.
 - In order to be alert to changes in her immediate environment, Gowri needs to have a memory of how things normally are and identify these changes.
- Self-care
 - Gowri maintains her hygiene and performs activities of self-care.
 - Hygiene is closely related to one's physical well-being and by performing activities of looking after herself, Gauri shows that she is actively maintaining her physical well-being in order.
- Social acts
 - Social acts indicate a feeling of bonding with other individuals.
 - Social acts also strengthen these bonds and by doing so, Gowri shows that it is worth investing her effort towards these bonds, as it will have a positive impact on her life.
- Strategies
 - Apart from just performing these acts, the manner of performing these acts is termed as a strategy.
 - Employing various strategies to make these things happen indicates a sense of circumpolar navigation.

Appendix B

Food items

Common Name	Scientific Name
Muskmelon	<i>Cucumis melo</i>
Beetroot	<i>Beta vulgaris</i>
Guava	<i>Psidium guajava</i>
Cucumber	<i>Cucumis sativus</i>
Papaya	<i>Carica papaya</i>
Sweet Corn	<i>Zea mays</i>
Moong Dal	<i>Vigna radiata</i>
Flattened Rice (poha)	<i>Oryza sativa</i>
Ragi Powder	<i>Eleusine coracana</i>
Jeera	<i>Cuminum cyminum</i>
Pepper	<i>Piper nigrum</i>
Salt	Sodium chloride
Turmeric Powder	<i>Curcuma longa</i>
Cooked Ration	
Napier Grass (Multi-cutter)	<i>Pennisetum purpureum</i>