CHAPTER 15

Hypertension

Enormous amount of work has already been done in recent years in the field of hypertension, especially with regard to its etiology, pathology and management. Still the incidence of this disease is increasing throughout the civilized world. It is surprising that in spite of all the progress, the exact cause of hypertension is not yet known, as a result of which no preventive measures could be undertaken. Many people feel that it is not a disease entity, but only a product of several etiological processes which ultimately lead to the development of hypertension as one of the manifestations.

ETIOLOGY

As discussed earlier, usually in all these cases of stress disorders, etiological factors can be divided into two groups: (a) Genetic and (b) Environmental. It is known that several members in the same family may be having hypertension. And a type A personality with excessive drive, aggressiveness and ambition may be more liable to have hypertension and coronary heart diseases than a type B personality with opposite features. Our own studies indicated that a mesomorphic constitution with greater capacity for turnover of catecholamines and their enzymes is more likely to develop cardiovascular diseases, especially hypertension than others.

EXPERIMENTAL EVIDENCES

In experimental animals also this has been proved by many workers. Okamota has developed a special strain of rats which develops hypertension spontaneously before the age of 12 weeks. This would indicate that genetical traits may play some
important role in the development of hypertension. Similarly, there are also certain inbred strains of rats which genetically become salt sensitive and which on administration of salt become hypertensive. In all these cases, the common site for the development of these traits is the brain, especially the hypothalamic region, because, injection of 6-Hydroxydopamine which prevents the action of catecholaminergic fibres, into the lateral ventricle of the rats of spontaneously hypertensive strain, prevents the development of high blood pressure. However, this is effective only if it is done before they are 10 weeks old. If this injection is given after this period, when the high blood pressure has already developed in these rats, the treatment with 6-Hydroxydopamine does not lower the blood pressure. It may not be out of place to mention here that in these strains of rats, once the high blood pressure levels are established one of the important agents which lower the blood pressure is an inhibitor of serotonin synthesis namely parachlorophenylalanine. All these findings show that noradrenergic and dopaminergic neurons in the hypothalamus are involved in the development of hypertension and that all the various etiological agents operate through these neurons. However, this matter will be further dealt with later.

ENVIRONMENTAL FACTORS

It is known that the urban population is suffering from hypertension more than the rural, because the former group is more exposed to emotional stress than the latter. In fact, hypertension seems to be more consistently related to environmental psychosocial stressful situation which requires a constant behavioural adjustment on the part of the individual. A rapid cultural change, migration to different environmental settings, migration from primitive societies to highly developed urban areas are some of the examples which might be responsible for inducing hypertension in an individual. Similarly, a rapid socio-economic mobility, such as a rich man suddenly becoming poor or vice versa may lead to hypertension. In fact, the life of educated persons living especially in the urban areas is associated with constant struggle for existence which results
in uncertainties of life situations. It is these persons who constantly worry over the rapid environmental changes and who do not themselves have the ability to adapt adequately to face these changing life situations, who are likely candidates for the development of hypertension.

PATHOGENESIS

Experimental: There are several methods of producing hypertension in experimental animals. Thus, one can produce hypertension in mice by giving environmental psychosocial stimuli in the form of overcrowding, mixing of two or more dominant males with one female, chronic territorial conflict and similar other situations for a period of six to twelve months. In monkeys by following the chronic avoidance technique in which these animals are required to press a lever to avoid shock, hypertension can be caused in about 15 days. In dogs, by the application of classical and operant conditioning technique in the form of repeated painful sensory stimuli associated with light or tone signal followed by exhibition of only light or tone, elevated blood pressure can be caused. All these three environmental types of psychic stress resulted in a continuous behavioural adjustment which ultimately led to the development of hypertension.

Similarly, the chronic stimulation of regions of hypothalamus leads to an integrated response involving a rise in blood pressure, constriction of splanchnic, renal and skin vessels, and dilatation of the vessels of skeletal muscles. These responses are due to general activation of the sympathetic nervous system which is associated with the emergency reaction of fight or flight as described by Cannon. Further, one can also assume that such an elevation of blood pressure following electrical stimulation of hypothalamus may closely resemble the condition of hypertension developing after chronic psychic and emotional stress.

The baroreceptors in the carotid sinus and aortic arch normally maintain blood pressure within the physiological limits. In case of hypertension, they are reset at a higher level. In experimental animals if they are sectioned, one can get
hypertension following any of the environmental stimuli. On the basis of results of above experimental methods, it can be said that brain, especially the hypothalamic region, plays an important role in the development of hypertension. In fact, it is one of the best examples of psycho-social stress causing a psychosomatic disease.

OTHER METHODS

But there are a few other methods of producing hypertension, in which the role of brain was not clear till recently. However, recent studies have further clarified the matter. It is known that experimental hypertension can also be produced by treating rats with DOCA and salt, by constricting the renal artery or tightly wrapping the kidney. Similarly, reference was also made earlier to the genetic strains of hypertensive rats, such as salt sensitive and spontaneously hypertensive strains. It seems that in all these cases the centres in the brain may not be playing any role in the causation and maintenance of high blood pressure. However, recent studies have indicated that this impression is not correct and that brain participates in everyone of these forms of experimental hypertension. Thus in rats, the DOCA and salt hypertension is associated with increased release of catecholamines from the sympathetic nerve endings and adrenal medulla. In such animals, if 6-Hydroxydopamine which destroys the catecholaminergic neurons, is instilled into the ventricles, the peripheral sympathetic nerve discharge becomes less. This ultimately leads to the prevention of DOCA and salt hypertension. However, once the hypertension has already developed, instillation of 6-Hydroxydopamine into ventricles does not lower the blood pressure. High blood pressure produced by constricting the renal artery can also be prevented in the same way by the intraventricular instillation of 6-Hydroxydopamine.

It is now well established that renal artery constriction causes release of renin and thus increases angiotensin II production. This substance, in addition to its other effects, causes powerful pressure effects in the brain which is mediated by the catecholaminergic neurons of the brain stem and hypothala-
mus. This leads to increased peripheral sympathetic discharge leading to increased blood pressure. If the effects of angiotensin II can be blocked by depleting the catecholamines of brain by 6-Hydroxydopamine, no high blood pressure occurs. In the same way in the spontaneously hypertensive rats also, if 6-Hydroxydopamine is injected into ventricles before the age of 10 weeks, hypertension can be prevented in these animals.

All these experimental studies indicate clearly that the hypothalamus and brain stem fully participate in the development and maintenance of every form of experimental hypertension. Although these experimental findings cannot be fully confirmed in the human situation, it does indicate that the catecholaminergic nerve endings in the brain stem and hypothalamus might be playing significant role in the predisposition, initiation and maintenance of hypertension in human beings also.

CLINICAL STUDIES

It is known that whenever a person is exposed to psychosocial stress, there occurs a transient rise in blood pressure as a result of sympathetic nerves releasing noradrenaline both at the centre and the peripheral nerve endings. If such a situation continues for a long time as a result of repeated and prolonged emotional disturbances, the patient in the beginning goes into a labile phase of hypertension with high cardiac output and normal peripheral resistance. Gradually, as time passes, this pattern changes towards normal cardiac output with higher peripheral resistance which does not occur in all the vessels of the body. Thus the renal, splanchnic and cutaneous blood vessels develop excess of peripheral resistance and the vessels of the skeletal muscles develop much lower peripheral resistance. The increase in peripheral resistance is dependent upon the disproportionate constriction of visceral and cutaneous vessels which is in excess of skeletal muscle vasodilatation. One should remember here that these haemodynamic changes seen in hypertension are similar to those noted during emotional stress and are also analogous to the state seen after the electri-
cal stimulation of hypothalamic centre in experimental animals. This further confirms that all these changes are due to the excessive release of neurohumors from the catecholaminergic nerve fibres at the brain stem. It can be very well realized that when an excess of catecholamine circulates in the blood it can readily produce constriction of peripheral (Table 2) vessels leading to the development of hypertension. Initially it remains labile. However, later on as the blood vessels become hardened, high blood pressure becomes a constant feature. If this high pressure continues for a long time, the vessel walls become weak and develop some tears here and there. These tears are usually repaired by deposition of cholesterol plaques in the vessel wall. When there is an excessive number of plaques, the vessel wall becomes narrower and narrower as a result of blockage. This leads to further increase in the blood pressure. Sometimes the plaques may get themselves detached from the arterial wall and cause further blockage of the vessels of vital organs like heart, brain etc. and initiate clotting.

In addition, high blood pressure may directly affect the heart since it has to pump blood through greater pressure to overcome the enhanced peripheral resistance. Thus the left ventricles become hypertrophied and then go into a state of failure. Thus, the patients of hypertension succumb sooner or later to myocardial infarction, cerebral apoplexy, or congestive heart failure. From these observations, one can very easily realize how recurrent psychological stress can ultimately produce such a dangerous situation for life in the course of time. Depending upon the various factors, such as personality and behaviour of the person concerned and the nature and severity of stressful situations in hypertensive patients, death may supervene within a short period after the onset of the disease, whereas in others the patient may remain apparently healthy for many years.

Management

Usually all the medical measures are directed towards lowering of blood pressure so that one could prevent the danger to
### Table 2.
Showing Total Plasma Catecholamine in Different Degrees of Hypertension
(Bhat, G.K., Vaish, S.K. and Udupa, K.N.)
(Unpublished Data)

<table>
<thead>
<tr>
<th>Cases</th>
<th>Catecholamine</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Controls</td>
<td></td>
</tr>
<tr>
<td></td>
<td>252.4 ng/ml ± 35.73</td>
</tr>
<tr>
<td>(24)</td>
<td></td>
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<tr>
<td>2. Essential Hypertension</td>
<td></td>
</tr>
<tr>
<td>(a) Mild</td>
<td>290.0 ng/ml ± 11.40</td>
</tr>
<tr>
<td>(32)</td>
<td></td>
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<tr>
<td></td>
<td>Diastolic Pres. from 95 to 110 mm. Hg.</td>
</tr>
<tr>
<td>(b) Moderate</td>
<td>309.0 ± 8.306</td>
</tr>
<tr>
<td>(8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diastolic B.P 110 to 125 mm Hg.</td>
</tr>
<tr>
<td>(c) Severe</td>
<td>349.0 ± 34.92</td>
</tr>
<tr>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diastolic B.P above 125 mm Hg.</td>
</tr>
<tr>
<td>3. Malignant Hypertension</td>
<td></td>
</tr>
<tr>
<td>with complications</td>
<td>337.0 ± 19.02</td>
</tr>
<tr>
<td>(11)</td>
<td></td>
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</tbody>
</table>

vital organs. In the early stages, the physician usually prescribes some tranquillizers like Diazepam. Similarly the use of Methyldopa is also found to be useful in controlling hypertension which acts through the hypothalamic region by reducing the activity of catecholaminergic fibers there. The reserpine group of drugs also has a similar action in reducing the blood pressure. But in addition, these drugs also tend to decrease the release and reuptake of noradrenaline from the synaptic junctions of sympathetic nerve endings. Similarly the use of beta adrenergic blockers such as propranolol has become very popular in recent years in properly selected cases with evidences of excess catecholamine turnover. Their main action is at the receptor level and hence the results are sometimes dramatic in otherwise very resistant cases of hypertension. In addition to these specific drugs, which mostly act on the neurohumoral output from the sympathetic nervous system, diuretics have also been tried with beneficial results in a certain percentage of cases.
However, one must admit that all these medical measures have their limitations. The tranquillizers are habit forming and hence they cannot be used for a very long time without risking the development of drug addiction in a certain percentage of patients. The reserpine group of drugs, if used for a long period, have also caused many disabilities in individual cases, such as depression, suicidal tendencies, loss of libido, allergic manifestation, etc. Further, recently there have been reports to indicate that prolonged use of reserpine in women may predispose them to develop cancer of the breast. In the same way, the prolonged use of powerful antihypertensive drugs may lead to some complications in certain part of the body. In the developing countries, the high cost and difficulty in maintaining efficient supply of drugs may also preclude the use of these drugs for a life-long period. Hence, there is an urgent need for a newer approach to the problem of management of essential hypertension.

**URINARY CATECHOLAMINE IN HYPERTENSIVES BEFORE AND AFTER THREE MONTHS OF YOGIC PRACTICES**

![Graph showing urinary catecholamine levels before and after treatment.](image)

*Fig. 49. In hypertension, the urinary excretion of adrenaline and noradrenaline increased by about 100%. However, after the practice of Shvasana there was a complete normalization of excretion of these substances in 3 months along with reduction of blood pressure.*
Hypertension

Yogic Measures for Hypertension

Amongst various yogic measures, the practice of Shavasana, a yogic relaxation posture, was found to be of much use not only as a curative measure, but also as a measure for preventing the development of hypertension (Fig. 49). Datey of Bombay and Chandra Patel of London used this method quite extensively with improvement in a significant number of patients. Similarly, Benson et al have used Transcendental Meditation for hypertension with good results in the majority of their patients. In all these cases it was postulated that the relaxation postures possibly produce their beneficial results by reducing the adrenergic and noradrenergic activity in the brain stem and the peripheral organs and tissues. (Fig. 50).

PHYSIOLOGICAL STUDIES

In order to study this problem in greater detail, we at first selected 6 young healthy female volunteers in the age group of 20 to 25 years. They were given Shavasana, a well known yogic relaxation posture, for 30 minutes every day for 3 months. In this posture they were asked to lie down on the floor without the support of pillow and were asked to attain full relaxation of all the muscles of the body gradually. Thereafter, they were asked to have complete psychic relaxation as far as feasible during the period of postural relaxation. We modulated the results of these measures by recording pulse, blood pressure, body weight, plasma cortisol, total catecholamines and histamine. These studies indicated no significant changes in any of these parameters after 3 months of practice of Shavasana except in respect of total catecholamine contents of the blood. There was a significant reduction of total catecholamine of the blood in all the subjects who underwent a course of Shavasana. This is in contrast to a group of volunteers who underwent a course of physical exercises in our gymnasium during this period. In all these people the catecholamine content increased significantly. This would clearly indicate that muscle relaxation in any form such as Shavasana or any other relaxation postural method would certainly produce considerable reduc-
Fig. 50. Shows different postures commonly used in the treatment of Hypertension. These will have to be individualized depending upon the circumstances and stage of the disease. Meditation is better as a preventive measure and Relaxation is good as a curative treatment.

tion in the catecholamine turnover leading gradually to reduction of blood pressure. Encouraged by these physiological studies we applied this technique to our clinical cases of hypertension (Figs. 51,52).

CLINICAL STUDIES

This study (unpublished) was conducted by Dr. S.K. Agrawal, Prof. S.K. Vaish and myself in our Institute Hospital. It was conducted on 50 people; of these 25 hypertensive patients were selected at random from the hypertension clinic. Five out of these 25 cases were given drug treatment before they were selected for this study. For the sake of comparison 25 normotensive people were also included as controls. All these 50 people were at first observed for six to eight weeks without any therapy for stabilization of their blood pressure. Thereafter, all of them were subjected to the practice of Shvasana for 30 minutes daily for 3 months. During this period, blood pressure
EFFECT OF YOGA AND HYPOTENSIVE DRUGS ON HYPERTENSION

Fig. 51. Shows BP of an intractable case of hypertension in which anti-hypertensive drug alone did not give much relief. An addition of yogic practice greatly helped to reduce the blood pressure in the next six months. was checked under lying down posture at weekly intervals for a proper comparison. During this period, plasma cortisol, plasma catecholamine and urinary VMA were also studied before, during and after the Shavasana treatment. For the sake of comparison these patients were divided into 3 groups: (A) 20 patients of essential hypertension without any drugs, (B) 5 patients who also received drug therapy and (C) 25 normotensive subjects. All these people were subjected to treatment by Shavasana or relaxation posture for 30 minutes in the morning and evening everyday.

Results of these studies indicated that Shavasana significantly reduced the blood pressure, both systolic and diastolic. Thus in group A patients the systolic BP came down from the mean level of 153.3 mm Hg to 139.3 with a difference of 15 mm Hg in 3 months. Similarly, the diastolic pressure came down
Fig. 52. Shows B P range in a very intractable case of hypertension in which the use of both aldomet and Beta Blocker did not yield the desired result. The addition of Shavasana produced considerable improvement in B P in the next two months.

from 102.7 mm Hg to 90.4 mm Hg amounting to a fall of 12.3 mm Hg at the end of 3 months. On further study we found that these beneficial results could be seen significantly in about 65% of the cases, whereas in others the results were equivocal.

In group B patients who received Shavasana and drug therapy, the results were more significant with a fall of systolic pressure of 31.2 mm Hg and the diastolic pressure of 18.8 mm Hg. This indicates that in cases of hypertension if Shavasana is combined with drug therapy one can get more significant result in a shorter period of time. 80% of these cases showed very impressive results when combined with drug therapy. On the other hand, in the normotensive subjects the differences in the systolic and diastolic pressure were insignificant.

In these cases, the clinical observations were further supported by laboratory findings (Tab. 3). Thus in 15 cases the plasma cortisol, catecholamine and urinary VMA were esti-
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mated. After Shavasana the plasma cortisol level was reduced from 27.4 to 25.2 with a significant fall by 2.47 μg/100 c.c. Similarly plasma catecholamine was reduced from 289.82 to 234.91 i.e. a significant fall of 54.91 μg/100 cc. The urinary VMA level fell down from 2.48 to 2.05, with a difference of 0.43 which was found significant whereas in normotensive subjects these differences were insignificant. Although several workers like Datey, Patel, Benson and others had conducted the clinical investigations of hypertensive cases with relaxation therapy, so far no one had adopted these laboratory parameters to prove that there is a considerable reduction in the stressful condition of psychosomatic apparatus of the patients after Shavasana therapy and that this reduction is not limited to the reduction in the blood pressure alone but also causes changes in behaviour and life style of the patient. Such a change is possibly mediated through the reduction in the activity of sympathetic nervous system.

Table 3
Table showing the changes in Catecholamine, VMA and Plasma Cortisol in Hypertensive patients after 3 months' Shavasana (Relaxation) Therapy
(Agrawal, S.R., Vaish S.K. and Udupa, K.N.)
(Unpublished Data)

<table>
<thead>
<tr>
<th>Estimation</th>
<th>No of cases</th>
<th>Before treatment</th>
<th>After treatment (Shavasana)</th>
<th>P. Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Plasma Catecholamine</td>
<td>15</td>
<td>289.82</td>
<td>234.91</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 12.01</td>
<td>± 13.07</td>
<td></td>
</tr>
<tr>
<td>2. Urinary VMA</td>
<td>15</td>
<td>2.48</td>
<td>2.05</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 0.23</td>
<td>± 0.23</td>
<td></td>
</tr>
<tr>
<td>3. Plasma Cortisol</td>
<td>15</td>
<td>27.49</td>
<td>25.02</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± 1.67</td>
<td>± 1.74</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 16

Stress and the Disorders of Heart

As discussed earlier, heart is well connected with hypothalamus through the sympathetic and parasympathetic nerves, so that all emotional or psychic changes are soon followed by changes in the function of heart and similarly, if there is any change in heart, say with regard to its blood supply, it is soon transmitted through visceroceptors to visceral centres of brain leading to successive changes in the limbic system, hypothalamic and heart. Thus, both the external environmental exciting factors and internal psychosomatic stress factors can influence heart and its function to a considerable extent. Therefore, if these exciting factors continue for a long time in a person with a weak heart due to environmental or genetic causes, he is bound to get the disease sooner or later depending upon various other predisposing factors. Coronary insufficiency, angina pectoris and myocardial infarction are some of the commonest conditions causing high mortality and morbidity in most of the countries. In addition, it is most alarming to note that these conditions are increasing every year in most of the developed and even in the developing countries, as they are becoming more and more civilized. Further, it is also becoming evident that death due to coronary vascular disease in the younger and middle aged people is increasing in most of the countries. What, indeed, are the various contributing and exciting factors for such a rapid increase in the incidence of these diseases in the civilized community? One of the obvious factors in the affluent communities of modern cities is that they eat too much and do too little physical work. Too much intake of fat is obviously responsible for the early development of atherosclerosis, though this has not been conclusively proved so far. Similarly, lack of physical exercise in these people is
another important factor which predisposes these people to develop coronary artery disease. It is known that muscular exercise improves circulation of the entire body including that of the heart and because of this there is no stagnation of circulation nor is there any blockage of smaller vessels in the early age. However, in the absence of physical exercise all these factors may operate so as to predispose a person to develop coronary artery disease. Similarly, excessive smoking, drinking too much of coffee and other similar beverages may also contribute to the development of this disease as a result of excessive release of catecholamines. In addition to this, the genetically inherited susceptible or ‘weak heart’ is another important hereditary factor which makes a person more vulnerable to the development of this disease than others. These are some of the predisposing factors, all of which may play some role in the causation of the disease. However, the most important exciting factor for the development of the disease is emotional stress.

Role of Emotional Stress

Usually psychological excitements of short duration do not produce serious disturbance in coronary circulation in persons with healthy heart or arteries. However, in people with any of the predisposing factors already operating repeated and chronic psychological stress may increase the susceptibility to the development of the coronary artery disease. It is more common in relatively young people with a high degree of professional responsibility. Thus, a young susceptible person with high ambitions, such as one aspiring for the Headship of some big organization is more liable to get heart attacks if he is exposed to recurrent emotional stress. I have known a very able and efficient Civil Engineer, who, because of his very hard work, rose to the position of Chief Engineer of a State at a relatively young age of 42 years. He unfortunately became a victim of heart attack and died within a year of his attaining the high position in view of the constant stress he received from his colleagues who were highly critical of his performance. One
can quote many such examples, for it is frequently observed that a patient of coronary heart disease usually has a very demanding job involving constant emotional stress, a job in which the responsibility that goes with the high position is more significant than the actual performance of work itself. Thus, the managers of big factories are more liable to get this disease than the subordinate workers with no responsibility for the output of their products. Further, those men who perform physical work along with their high intellectual activity are less liable to develop this disease than those who constantly do overwork mentally. Here one should also remember that some people react to stressful situations more intensely than others and hence such people with a high degree of sensitivity to a given situation are more liable to get this disease.

PATHOPHYSIOLOGY

It is now well known that the emotional stress causes disturbance in hypothalamus which is also the centre for sympathetic and parasympathetic nervous system. Therefore, whenever there is constant excessive stress, the sympathetic nervous system is stimulated which increases the activities of heart and circulation leading to rise of blood pressure, heart rate etc. Such an increase in the activity of the sympathoadrenal system leads to excessive liberation of adrenaline and noradrenaline which further enhances the activity of heart without the corresponding increase in the oxygen supply to the myocardium. This leads to insufficiency of coronary circulation giving rise to various manifestations of angina pectoris. However, if such a situation is allowed to continue for a longer period, it may lead to coronary thrombosis at a later date. Normally when excessive catecholamines are formed they are neutralized by various degrading enzymes and also by acetylcholine. However, if there is too much of stress these antagonizing mechanisms fail and the patient develops the clinical features of coronary insufficiency. Many times, the clinical features of this condition itself may cause anxiety in these patients which may further interfere with the coronary circula-
tion. Thus, various environmental disturbances cause psychic stimulation as a result of increased activity of the psychic centre of brain. From here the stimulation reaches hypothalamus via the limbic system causing emotional disturbances and excitement of the sympathetic nervous system. These changes in hypothalamus lead to excessive liberation of catecholamines without the corresponding increase in their degrading substances. If such a situation is allowed to continue for a long time in a person with a sensitive and susceptible heart, it leads to the development of coronary insufficiency with manifestation of angina pectoris. However, if the person is already having the features of coronary artery sclerosis, the severe mental stress may lead to the development of sudden heart attack or coronary thrombosis.

MECHANISM OF CORONARY ARTERY SCLEROSIS

It should be remembered that psychic stress not only causes neurohumoral changes, but also results in various metabolic changes. It is now well established that the excessive outpouring of catecholamine and cortisol causes increased glycogenolysis and gluconeogenesis. In addition, severe stress also leads to marked increase in the serum cholesterol level. This indicates that nonesterified fatty acids can be easily mobilized from the adipose tissues during stressful situation. In addition, excessive production of adrenaline and noradrenaline may increase the intimal absorption of lipids leading to damage to the vascular tissue. Further, it has also been proved experimentally that the deposition of cholesterol in the intima can be accelerated by the excessive use of adrenaline. In fact, emotional stress would seem to increase the possibility of abnormal lipid deposits. This would be so particularly in a subject loaded with freely circulating fatty molecules as a result of excessive mobilization of lipids from their depots or as a result of excessive dietary intake of fat. Once these lipids and cholesterol molecules are deposited in the subintimal space, the lumen of the vessels gradually get narrowed down. Gradually these lipid molecules become calcified, when the full fledged features of
atherosclerosis become manifest. This will fully explain how chronic emotional stress can lead to the development of atherosclerosis, especially in the vital vessels such as in coronary arteries or in the arteries supplying the brain.

In addition, stressful situation also increases the viscosity of blood and decreases coagulation time. The decrease in coagulation time occurs as a defence mechanism to prevent bleeding during emergency. However, if such a situation continues for a long time it may do more harm than good. Thus, a prolonged stressful situation with increased viscosity of blood and decreased coagulation time may result in the early development of arterial thrombosis in a vessel which is already constricted due to subintimal deposition of lipids. Hence, chronic emotional strain can hasten the development of atherosclerosis and coronary thrombosis through various factors mentioned above, especially in the people who take diet rich in fat, who resort to excessive smoking or who are already subjects of hypertension or diabetes mellitus.

ROLE OF STRESS DURING HEART ATTACKS

When chronic stress becomes superimposed with acute stress, many serious cardiovascular changes may set in, such as rapid heart rate with increased cardiac output, abnormalities in heart rhythm, changes in blood pressure, blood viscosity, blood clotting time etc. Such an acute situation develops whenever a patient suddenly develops coronary thrombosis with myocardial infarction. During this, there is a sudden increase in the output of adrenaline and noradrenaline leading to most of the changes mentioned above. Amongst them most serious and life threatening complication is the development of cardiac arrhythmia. This subject was extensively studied by Bhat, Vaish and myself in a group of 83 patients admitted to the Coronary Care Unit of our Hospital. In these cases, neurohumoral levels such as acetylcholine, catecholamine, histamine and also plasma cortisol were estimated at the time of admission, and daily thereafter till the patient was discharged (Fig. 53). From these laboratory studies we could arrive at the
Fig. 53. Shows Neurohumors in Acute Myocardial Infarction. In these cases whenever there were complications of arrhythmia and cardiogenic shock, all the neurohumoral content and cortisol increased. However, when the complications were overcome, these neurohumors also came down to a lower level. Thus neurohumoral changes are the basic factors for the development of these complications.

A conclusion that there is a close correlation between the severity of arrhythmia and the amount of catecholamine in the blood. The more severe the arrhythmia, the higher was the catecholamine content of the blood. If the level of catecholamine gradually decreased, the patient fully recovered from arrhythmia. If the catecholamine level increased to a higher level after admission, the patient usually succumbed to the disease. All these findings clearly indicate that during heart attacks, the estimation of plasma catecholamine and cortisol not only helps us to know the amount of stress that is operating in a given patient, but also would help us to assess the prognosis of individual cases. Hence, these investigations should be invariably carried out.

MANAGEMENT

It is now well established that coronary occlusion occurs as a result of many predisposing and exciting factors amongst
which emotional disturbances play a dominant role. Therefore, in such cases the mere administration of coronary vasodilators may not serve the purpose unless they are also accompanied by tranquillizers such as diazepam and other similar preparations to control the emotions. Since most of these patients are in a state of severe anxiety at the time of recovery from heart attacks, the use of diazepam and other preparations would be of particular use to reduce the anxiety state by breaking the vicious circle of harmful reactions which exist in most of these patients. Thus, in the acute stage of the disease, the use of any of the tranquillizers has a great role to play in inducing artificially a state of relaxation which greatly contributes to the quick recovery of these patients. The free use of this drug on the one hand screens off the harmful influence exerted by the emotional stress on the heart, and on the other it tones down the emotional reactions triggered off by the heart disease itself and on the autonomic nervous system. In short, for sedation and relaxation in myocardial infarction, it is necessary to have a drug which has little effect on blood pressure and pulse rate. Hence for this purpose the diazepam in dosage of 5 to 10 mg three times a day seems to be an ideal preparation. Similarly, it also greatly helps to reduce the tension of patients with angina pectoris and coronary insufficiency. In all these cases use of coronary vasodilatation alone will not be of much use unless these patients are also given the tranquillizers simultaneously. If these conditions are associated with excessive plasma catecholamine one can also use the beta adrenergic blockers such as “Inderal” for preventing the development of cardiac arrhythmia in the acute state. After overcoming the acute attack, one should continuously take proper precaution in preventing the recurrence of this disease. Similarly in angina pectoris and coronary insufficiency, one will have to prevent the development of acute attacks of coronary occlusion. In order to do that, the use of Shavasana or relaxation posture greatly helps these patients by reducing their catecholamine contents in the blood. This makes them gain more stress competence so that sooner or later they
become resistant to various types of environmental stress. Therefore, a judicious use of Shavasana has a definite place not only in producing quick recovery of patients after heart attacks, but also in preventing the development of coronary thrombosis by reducing the stressful state of these patients. Therefore, it should be freely recommended to all these patients.

FUNCTIONAL CARDIAC DISORDERS

About 50% of the patients attending the hospital with the complaints referable to cardiac disorders are not having any organic cardiac diseases. Most of such patients usually suffer from cardioneurosis. Such conditions are also known as Neuro-circulatory Asthenia in which there are disturbances of autonomic nervous system as a result of excessive psychological and emotional tension. As a result of these changes, the patients get dysfunction of cardiovascular system along with the disturbance in the emotional set-up. Thus, one of the important features of such a disturbance of cardiovascular system is the development of cardiac arrythmia. So far it was felt that cardiac arrythmia was thought to be only due to some organic changes in the cardiac musculature or in the coronary vessels. It is only recently that clinicians have realized that cardiac neuroses or functional cardiac disorders are the clinical entities which are caused by excessive psychic stress resulting into the functions of autonomic nervous system. In view of this, one must emphasize the fact that a large number of cases of cardiac arrythmia in which there occurs disturbance in the initiation and conduction of heart beat can occurs functionally without any local heart disease. In fact, anxiety and emotional tension are the most important extracardiac causes of cardiac arrythmia. Amongst various disorders, emotional tension and anxiety have been reported to be responsible for the production of following types of cardiac arrythmia: (1) sinus tachycardia, (2) sinus bradycardia, (3) sinus arrythmia, (4) extrasystoles, (5) paroxysmal tachycardia, and (6) pseudo-angina.
SINUS TACHYCARDIA

Physiologically this condition occurs as a result of physical exercise, increased metabolism or as a result of rise in temperature. In all these conditions there is increased stimulation of sympathetic nervous system leading to the development of tachycardia. In the same way emotional excitement may also cause sinus tachycardia as a result of stimulation of sympathetic nervous system. This situation can also be considered physiological. However, one will have to consider it pathological when the acceleration of the heart rate is too great or too prolonged. Similarly, it can be treated abnormal if the tachycardia comes up on slightest exertion or after a slight rise of temperature. In such cases, one will have to assume that there is hypersensitiveness of the psychic centre, which operates through the easily excitable centre of sympathetic nervous system in the hypothalamus. Sometimes a person gets tachycardia as a result of emotional disturbances and then he becomes anxious about his cardiac dysfunction which results in the further vicious circle of excitement and apprehension leading to tachycardia for a prolonged period. All these functional tachycardias can be successfully treated by a judicious use of tranquillizers with or without beta-blockers in the acute stage. However, for preventing such attacks of sinus tachycardia and also to minimize the duration of such attacks, yogic practices in the form of postures greatly help these patients. It seems that these yogic practices minimize the duration of such attacks; yogic practices in the form of postures greatly help these patients. It seems that these yogic practices minimize the psychic and emotional reaction to environmental stress leading to minimal sympathetic nerve activity and tachycardia.

SINUS BRADYCARDIA

This is comparatively a rare condition and it occurs as a result of an increased activity of the parasympathetic nervous system instead of the sympathetic on receiving some type of psychic stress. Here the pulse rate becomes low and the patient usually gets attacks of giddiness and fainting for a variable
period. Even in this condition is appears very often that one will have to treat with tranquillizers, such as diazepam, in the acute stage followed later on by yogic practice for getting lasting relief.

**SINUS ARRYTHMIA**

This condition occurs when both the parasympathetic and sympathetic nerves are stimulated alternately on receiving some severe emotional stress. These people are usually very sensitive since birth and their autonomic nervous system is also genetically highly reactive. They are usually very creative personalities and can fall victim to this condition on the slightest provocation. Because the heart gets stimulus for developing tachycardia and bradycardia irregularly, it goes into the state of sinus arrhythmia. Thus, whenever the patient goes into a state of psychic excitement his heart starts beating irregularly but the moment the excitement subsides, the irregularity of the heart beat also stops and he goes into a state of regular heart beat. The seat of all these disturbances is the psychic centre of the brain which is situated in the frontal lobe and it can be rectified by the regular practice of Yoga and administration of tranquillizers.

**EXTRASYSTOLES**

Although the extrasystoles are usually considered to be due to organic lesions in the myocardium they can also occur as a result of emotional tension, psychic stress or dysfunction of autonomic nervous system. Hence one should remember that extrasystoles can occur even with healthy hearts in a large percentage of cases if the psychic stress is severe enough to cause such a functional disorder. Even here vicious circle phenomenon may set in and highly sensitive persons can develop extrasystoles with greater stroke volume preceded by a missing heart beat. Such a situation may perturb the patient too much which may trigger off further exacerbation of symptoms and signs leading to more of such extrasystoles. Therefore the major emphasis in treatment as stated earlier, should be psychotherapy, tranquillizers and yogic practice.
PAROXYSMAL TACHYCARDIA

Paroxysmal tachycardia is one of the common functional cardiac disorders seen in association with anxiety and emotional stress. In this condition there occur attacks of tachycardia all of a sudden preceded usually by a stressful life situation. Some time the attack may come up at the slightest emotional stress and it usually leads to the feeling of severe palpitation and anxiety. This situation further aggravates the attack of tachycardia which sets in the vicious circle reaction. As the state of anxiety decreases the condition also gradually subsides by itself. However, the patient becomes so much disturbed by such repeated attacks that he loses his confidence to lead a normal life. Hence it needs a prolonged treatment on the lines mentioned earlier to get lasting relief.

PSEUDO-ANGINA

This is the condition commonly seen in young people who get dull pressure over the precardium for some time and then get an attack of sharp pain in the region of the heart. Often these patients get pain almost identical with that of true angina. However true angina usually shows a tendency to occur after physical exertion, sexual intercourse, cold stress or after heavy meals, whereas pseudo-angina occurs all of a sudden without any such exertion. In such cases alongwith pain in the precardium the patient also often gets certain respiratory symptoms such as sensation of strangulation of upper respiratory tract, a sensation of suffocation, laboured or stertorous breathing, dyspnoea etc. From these additional features of respiratory neurosis which usually accompanies pseudo-angina one can make the correct diagnosis and institute the appropriate treatment directed more towards the psychic centre than to the heart itself.

In short, all these functional cardiac disorders occur in a highly neurotic and sensitive person with great fear of a likelihood of his getting heart attacks at a future date. This fear is very often the result of tremendous emotional immaturity with excessive need for love and protection. These patients usually
have excessive anxiety about their own health and also about that of their family members. They show a complete lack of confidence in themselves and hence any sudden and severe stress can cause the development of any of the above stated functional cardiac disorders. These patients often complain of fatigue and exhaustion after working for a short while and thereafter they become easily irritable and excited. All these features can be collectively labeled as neurasthenia features which make these patients more susceptible to get various cardiac neurotic conditions. Once they develop one of these conditions a vicious circle is formed resulting in anxiety followed by further aggravation of their clinical features referable to any one of the functional cardiac disorders. As already discussed, mere symptomatic treatment directed towards the heart, such as vasodilators, betablockers or digoxin will not

Table 4.
Table shows a comparative value of Neurohumoral changes before and after the Shvasana type of Yoga Therapy and Diazepam Therapy for six months for functional cardiac disorders (Cardiac Neurosis).
(Singh, R H, Dubey, G.P and Udupa, K.N.)
(To be published)

<table>
<thead>
<tr>
<th>Neurohumor</th>
<th>YOGA THERAPY</th>
<th>DIAZEPAM THERAPY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before</td>
<td>After</td>
</tr>
<tr>
<td></td>
<td>treatment</td>
<td>treatment</td>
</tr>
<tr>
<td>Plasma Catecholamine (ng/ML)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>236.42 ± 33.48</td>
<td>196.00 ± 18.30</td>
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<tr>
<td>Urinary VMA (Mg/24 hrs.)</td>
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<tr>
<td></td>
<td>4.21 ± 0.90</td>
<td>2.67 ± 0.52</td>
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<tr>
<td>Plasma Cortisol (Ug%)</td>
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<tr>
<td></td>
<td>33.19 ± 7.32</td>
<td>22.53 ± 5.44</td>
</tr>
<tr>
<td>Urinary Hydroxy Corticoids (Mg/Gm Creatinine)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>10.51 ± 2.27</td>
<td>9.16 ± 1.1</td>
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relieve these patients for a period unless they are also treated for their associated psychological disturbances simultaneously. Hence a detailed psychic history of all these patients should be taken and appropriate psychotherapy should be instituted. In addition various tranquillizing measures already discussed elsewhere should be used freely to get over the vicious circle phenomenon originating in the hypothalamus and limbic system. The use of these drugs helps greatly to tide over the acute situation. However, for a prolonged use they should not be recommended since they are likely to become less effective and hence there is a tendency to take them in higher dosage leading to the development of drug addiction. Hence we advise yogic exercises and breath control for younger people and meditation for older people with satisfactory and lasting relief. All those who resort to Yoga gradually develop self-confidence in themselves to tide over the acute situation and then they gradually become free from all anxiety conditions usually leading to satisfactory and lasting cure (Table-4). Hence all these measures must be started together by the patients in order to get complete cure.
CHAPTER 17

Bronchial Asthma

This is a common condition in which a person gets attacks of difficulty in breathing. He feels greater difficulty in expiration than in inspiration. The condition is usually associated with feeling of tightness in the chest, cough and audible wheezing. In between the attacks, the patient may remain normal or near normal. The duration of attack may vary from a few minutes to a few hours, but sometimes it may last for days. Usually such attacks come at night and may remain for a variable period of time.

There are three main causes which may excite the onset of the disease, namely (a) infection of the respiratory passages, (b) respiratory allergy to certain specific allergens and (c) psychophysiological reactions to stressful life situations. Even amongst the three, stressful situations seem to be the most important factor which predispose a person to the development of this disease. Hence this factor needs special consideration.

It is observed that hypersensitivity that is seen in these patients is partly hereditary and partly acquired. This hypersensitivity is not limited to the mucous membrane of the air passages alone, but also involves the entire central nervous system which on stimulation releases excess of acetylcholine. The patients are hypersensitive not only to the various chemical substances in the environment as was often postulated, but also to specific human beings in the environment. Therefore, many times the attacks of asthma come as a result of conflict between the person and his environment to which he is unable to react externally by fight or flight reactions due to various social reasons. This certainly leads to excess liberation of acetylcholine from CNS which produces the sensitized bron-
chal musculature to go into a state of severe tonic contraction and bronchial secretions leading to the development of asthmatic attacks.

This hypersensitive personality is partly a hereditary trait and partly acquired and such personality traits can be seen in many psychosomatic disorders. Groen, a pioneer worker in the field, has described the neurotic “Core” of asthmatic patients as follows:

1. Marked ego-centric personality.
2. A tendency towards impulsive behaviour.
3. A diminished capacity for adaptation to unfavourable life situations.
4. A tendency towards developing a dominating personality.
5. A greater emotional hypersensitivity.
6. A greater demand for love and affection.
7. Stubbornness which may lead to conflict with the key figures in the social environment.
8. Strong reactions of jealousy and rivalry which make these patients somewhat unpopular.
9. Refusal to solve inter-personal conflicts by “talking it over” or by adopting give-and-take policy.
10. A disturbed psycho-sexual development: men often becoming sexually inhibited and women frigid.

All these personality traits can be seen clearly in most of these patients, some of whom are in almost constant conflict with their environment. Hence, many of these asthmatic patients become not only medical failures but also social failures. But in others these traits may not be so conspicuous and one can get to know them only when one subjects them to a detailed study. Further, in many of these patients a change of environment produces a dramatic beneficial effect. Although there may be many explanations, it appears that mainly it is due to shifting to an environment which is free from interhuman stressful situations.

Another evidence to support the psychogenic origin of asthma is that a well planned psychotherapy has been shown to
be beneficial in many cases of asthma. Thus, a daily practice of relaxation postures together with breath control exercises has been shown to cure quite a number of asthmatic patients. It seems that allergy and infective condition only act as exciting factors on a person who is susceptible to such attacks due to a specific personality trait and a hostile human environment.

In all such cases with a feeling of frustration resulting from the action of a dominant personality, the autonomic nervous system becomes activated, especially the parasympathetic nerves. Thus, the susceptible organ, the tracheobronchial tree in these patients which had become sensitive partly as a result of hereditary factors and partly due to various environmental factors since birth, becomes the target of various physiopathological changes. At first, as a result of excess of acetylcholine stimulation without the concurrent rise of catecholamine, there occurs a spasmodic contraction of smooth muscles of the bronchi. This leads to constriction of bronchi and especially the bronchioles causing airway obstruction. Thus, bronchial mucous membrane becomes congested which leads to excessive secretion of mucus which accumulates in the tracheobronchial tree. Thus, the bronchial spasm accompanied by mucus collection in the tracheobronchial tree causes the expiratory wheezing in these cases. This swollen mucous membrane patched with excess of mucus collection in the entire tracheobronchial tree is more sensitive to bacterial infection and hence the process of infection becomes readily added to the entire complexity of the problems. From these facts one can see that though psychological stress is the main cause for initiating this disease, its further development and perpetuation mostly rest with the development of allergic phenomenon and also the superadded periodical infection. Therefore, we should recognize these facts in the early stage of the disease and adopt appropriate preventive and curative measures for a lasting relief.

Treatment

Since it is now well established that asthma is a psychoso-
matic disease, all the preventive and curative measures must have a psychosomatic basis. Mere investigation of allergic or infective phenomenon by the body-oriented medical men or the study of psychic stress by the psychiatrists will not solve the problem of these patients. To give a lasting relief, it needs an integrated interdisciplinary approach for improvement in the treatment of these patients.

With regard to the prevention, one should be able to detect the early signs of this condition in the childhood period. Thereafter, one should institute preventive measures both from the bodily and psychological point of view. Mere testing of allergic phenomenon and its treatment will not serve the purpose. Simultaneously with this, one will have to make psychological and behavioural approach also, to prevent this condition from the very beginning. If the child is young in age, even psychotherapy of the mother would give the required benefit to the child. Such a psychotherapy should include relaxation therapy, Yoga or meditation. A regular practice of any of these measures would certainly prevent or delay the onset of this disease if it is adopted from the very childhood. In addition, various physical factors, such as obstructed air passages, recurrent respiratory infections, excessive tobacco smoking or excessive air pollution by industrial gases are some of the factors which may predispose the onset of this condition in susceptible persons. Therefore, they must be properly looked into and various preventive steps should be taken to overcome these problems. Thus, while establishing any new industry, people in authority should be told that proper disposal of industrial gas must be ensured, so that it does not cause menace to the people. It is always wiser to combine human health and happiness with prosperity rather than a bit of prosperity prevailing at the cost of human wellbeing.

Another factor which may predispose the development of this disease is excessive tobacco smoking from the very young age. Needless to say that it produces chronic irritation of the bronchial mucosa leading to spasm and infection repeatedly. Therefore, efforts should be made to reduce the use of tobacco in all such susceptible persons with a particular type of psychic
personality. Even here the regular practice of meditation might reduce the requirement of tobacco as was shown by Shaffi and others.

CURATIVE TREATMENT

In the acute stage of the disease there is no alternative but to institute the appropriate medical measures to tide over the situation. Since most of the medical treatment of this condition is symptomatic, the following measures are found useful: 1. Bronchodilators, viz. Isoprenaline inhalation or injection of Adrenaline 0.3 to 1cc subcutaneously give prompt relief. Similarly Aminophylline by mouth or by intravenous injection 0.5 gm in 5% glucose solution also helps immediately. 2. If these fail, the administration of corticosteroids greatly facilitates tiding over the acute situation. Similarly judicious use of antibiotics and expectorants helps them to reduce the infection and also to clear the air passages. 3. Change of environment, elimination of contact with allergens and psychotherapy may also help considerably to overcome the acute phase of the disease.

In addition to these medical measures, a well conceived Yoga therapy has been found to be of much use in most of these cases not only in preventing the attacks, but also in reducing the severity of the attacks. Whereas it may be difficult to say at present whether this therapy can completely cure this disease, one can certainly say with confidence that this type of therapy greatly helps to reduce the severity of the condition if it is resorted to at a relatively early stage.

In our practice, we give Yoga therapy both in the form of 8 postural exercises (Asanas – Appendix) and breathing exercises (Pranayama) everyday. In all we had given this treatment to patients of bronchial asthma of either sex belonging to the age group of 15 to 40 years. These 8 postural exercises are of vigorous type and hence the patients had to get the full training at our Centre for a few days. Thereafter, they continued these exercises at their homes and they periodically reported to us for a follow-up examination. All these patients were originally examined, investigated and treated in our chest Clinic. When
HISTAMINASE AND HISTAMINE IN CASES OF BRONCHIAL ASTHMA IN DIFFERENT CONDITIONS

Fig. 54. Shows the levels of histamine and histaminase in bronchial asthma cases. When the patient is not under attack their level remains within normal limits. During the attacks their levels go high and in status asthmaticus their levels go to the highest peak.

the results of modern treatment were found unsatisfactory, they were referred to Yoga Clinic for getting the necessary treatment. In the Yoga Clinic, in addition to the recording of changes in clinical status of the patients before and after yogic exercise, changes in the excretion pattern of neurohumours in the urine were also investigated. Amongst the neurohumors, urinary excretion of choline which would roughly indicate the acetylcholine turnover and the urinary excretion of adrenaline and noradrenaline indicating the turnover of catecholamine were studied in these cases. Our preliminary investigations of these patients clearly indicated that these patients had a marked increase in the formation and excretion of acetylcholine and histamine (Fig. 54, 55) and a comparatively reduced activity of adrenaline, noradrenaline and cortisol (Table-5). We could then fully give a biochemical explanation of the physiopathology of this condition. It is suggested that bron-
Fig. 55. Shows the pattern of blood histamine levels in different stress diseases. Our studies reveal that the patients with one of the common allergic conditions such as Bronchial Asthma have the maximum rise of histamine level in the blood especially during the attacks.

Bronchial constriction results from excessive formation of acetylcholine or, deficiency of catecholamines and cortisol (these patients become unable to overcome the action of acetylcholine) or, it may be due to both the above factors operating simultaneously in these cases. Recently, reports have also appeared which indicate that there is also a deficiency of urinary excretion of cyclic AMP in these cases, thus further reducing the activity of adrenaline.

Hence, the treatment of this condition with adrenaline or cortisone is nothing but a physiological replacement therapy just as we give insulin in cases of diabetes mellitus. So far, this was not emphasized enough and hence this needs further study as to whether this condition is primarily due to parasympathetic nerve predominance or due to sympathetic nerve deficiency or due to both. The replacement therapy with these neurohumors will have to be planned accordingly.
Table 5.
Shows Neurohumors and Plasma Cortisol in Bronchial Asthma before and after treatment by Yoga for 3 months.
(From Bhushan Kumar, Jha, V.K. and Udupa, K.N.)
(To be published)

<table>
<thead>
<tr>
<th></th>
<th>Acetylcholine $\mu$g/ml</th>
<th>Total Catecholamine ng/ml</th>
<th>Histamine ng/ml</th>
<th>Histaminase PU/ml</th>
<th>Plasma Cortisol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (15)</td>
<td>0.714 ± 0.128</td>
<td>242.4 ± 7.519</td>
<td>51.27 ± 12.49</td>
<td>90.20 ± 14.69</td>
<td>21.12 ± 3.91</td>
</tr>
<tr>
<td>Bronchial Asthma</td>
<td>1.29 ± 0.39</td>
<td>251.30 ± 11.88</td>
<td>135.65 ± 46.03</td>
<td>158.79 ± 29.60</td>
<td>13.43 ± 8.27</td>
</tr>
<tr>
<td>before treatment (40)</td>
<td>0.949 ± 0.249</td>
<td>255.6 ± 7.80</td>
<td>116.8 ± 13.68</td>
<td>146.66 ± 24.17</td>
<td>15.43 ± 2.95</td>
</tr>
<tr>
<td>Bronchial Asthma</td>
<td>0.494 ± 0.01</td>
<td>7.80 ± 0.05</td>
<td>0.05 ± 0.05</td>
<td>0.01 ± 0.01</td>
<td>0.001</td>
</tr>
<tr>
<td>after treatment (5)</td>
<td></td>
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</tbody>
</table>

What surprised us still more was that when we made these patients undergo the practice of yogic exercises, they gradually got the feeling of physical and mental well-being followed by reduction in the severity of attacks, and reduction in the requirement of drugs like aminophylline or cortisone. In most of the cases, the improvement was sustained, though somewhat slower than one usually expects to get. As one observes the improvement clinically one also finds the biochemical changes for the betterment. Thus, gradually the choline content becomes less and the urinary adrenaline, noradrenaline and 17-hydroxy-corticoids contents improve and reach the normal level. From these observations, one can say that yogic and breathing exercises given to these patients are physiological procedures without the aid of any drug which fully correct the biochemical deficiencies and bring them towards normal level. As a result one can notice a gradual improvement in the clinical condition of these patients. Hence, once the improvement is attained it can be maintained throughout the period of one's life, provided he is prepared to continue such yogic exercises.
In fact, yogic exercises would keep the person young and active and he is likely to get many other benefits of Yoga throughout his life. Hence, in all intractable cases of asthma especially if it occurs in young age, the role of Yoga should be fully explored and it should be recommended for all such cases. The following case record may illustrate these points.

CASE REPORT

Mrs. C, a 25 year old woman, came to us with a history of recurrent attacks of severe bronchial asthma for last four years. She was keeping a good health in her early age, though she used to get the upper respiratory tract infections quite often. However, after her marriage, when she shifted to a new town she started getting attacks of bronchial asthma, with severe wheezing and breathlessness. On enquiry it was found that her husband was a very dominant person with strong views on every aspect of life. This lady also appeared to be of strong will, she always tried to adjust to her husband by suppressing her own views. From her history it became obvious that this suppressed emotional distress probably played an important role in causing attacks of bronchial asthma.

In the beginning attacks used to come for a short duration, and used to be relieved by aminophylline. But gradually as the time passed, her attacks became more frequent and lasted for a longer period. At this period even the medicines did not give her adequate relief. At the time of her visit to our Clinic, even heavy doses of cortisone would relieve her only for a short period. On examination she was found to be a typical case of bronchial asthma with marked wheezing throughout the chest. Various investigations did not contribute much to our management. The allergic test to various agents also did not reveal any specific material to which she was allergic. Hence we decided to put her on a course of yogic practice as a trial measure. We thought this would help her much in view of the fact that there was a hidden yet strong psychological conflict between herself and her husband in various matters of life. However, she could not express them openly in view of the social customs and systems prevailing in the family.
She was put on the usual eight yogic exercises and also on the breathing exercises daily. To our great satisfaction, the frequency of the attacks gradually became less and so did the requirement of the medicines. Gradually in six months, her attacks were very few and lasted for a short period. Within a year her health improved considerably, so much so that she conceived a baby which she did not have for the preceding five year of her married life. However, during the later part of her pregnancy, she had to stop the yogic exercise and this soon resulted in recurrence of attacks of asthma. In spite of giving all the patent drugs it did not give her enough relief. After the delivery of the baby however, when she started doing yogic exercise the severity of the attacks of asthma became much less and she is carrying on with her life extremely well.

From this case one should be able to realize that yogic exercise will be of immense help to those patients who have strong psychological reasons for the development of the disease. In others with strong background of allergy or infection it may not work so spectacularly as it would work in the first group. Further, yogic practice would work well in the early case of such diseases in young people with no definite pathological lesions in the tracheobronchial tree. Once the disease has produced irreversible damage to the tissues, yogic practice would not be able to restore it back to normalcy. Hence, it should be resorted to at an early stage. In fact, we have observed that if those persons who are the likely or susceptible candidate for the development of asthma start practicing Yoga from the very beginning, they can completely prevent the development of this disease. One should also remember that the effect of yogic exercises remains in the body only for 24 hours. Hence they have to be practiced regularly at least once a day.

Further, one should remember that mere meditative type of yogic practice will not be of much value and so we have to recommend Hatha Yoga type of practice viz. eight standard yogic postures and exercise of breath holding (Pranayama), because we have already found that in this disease there is
BIOCHEMICAL CHANGES IN BRONCHIAL ASTHMA BEFORE AND AFTER YOGA

Fig. 56. Shows significant decrease of urinary adrenaline, noradrenaline, choline and 17-hydroxy-corticoids in cases of bronchial asthma in comparison to control subjects. After practice of yogic exercises for three months all these biochemical disturbances could be normalized to a considerable extent.

excess of acetylcholine and deficiency of catecholamines. This can be reversed towards normalcy by the Hatha Yoga practices, which induce reduction of acetylcholine and increase of catecholamine (Fig. 56). From that point of view Hatha Yoga practices in case of bronchial asthma seem to be ideal physiological method of treatment involving no harmful effect of potent drugs and with no cost to the patient. Hence, it is strongly suggested that more and more physicians should adopt such non-medicinal procedures, for giving a lasting relief to these patients suffering from such a debilitating disease as bronchial asthma. However, in acute attacks, the modern medical procedures have to be adopted.
CHAPTER 18

Chronic Peptic Ulcer

The disease, peptic ulcer, is known to occur for more than 2500 years. In fact, there are references in Ancient Indian Medical Texts to this disease by the names of “Amlapitta”, “Parinam Shool”, “Annadra Shool” etc. They have also discussed the clinical features so typical of this disease and also advised various treatments. Some of these topics will be discussed later in appropriate context. Suffice to say here that this disease was well known to our ancients and they had discussed this condition at length.

In modern times, various theories regarding the etiology of this condition were put forward by several earlier workers. Amongst them the neurogenic theory received considerable attention. Talmo almost a century ago put forward the neurogenic theory for peptic ulcer formation. Clinically he observed that the patients of peptic ulcer were in great nervous tension, and therefore he postulated that an intense vagal activity as a result of these tensions, may be responsible for causing these ulcers. In order to prove this, he carried out his experiments in rabbits and observed that electrical stimulation of the vagus nerve increased the secretion of gastric juice. In addition, he also observed tonic contraction of the stomach musculature with closure of pylorus and in some animals shallow ulceration in the stomach mucosa. From these experimental and clinical observations one could say that the vagus nerve played an important role in the causation of peptic ulcer. In the beginning of this century, Cushing observed gastric ulcer in patients with brain injury or tumour in the hypothalamic region. He felt that these ulcers were not due to only peripheral action of the vagus nerve, but also due to central stimulation of the hypothalamic
region from the psychic centre of brain which ultimately led to various changes in the stomach mucosa and musculature mentioned above. Therefore, he postulated that those highly strung persons who were classified as vagotonics and who were liable to get too much of emotional disturbances as a result of worry, anxiety and excessive responsibility combined with other factors such as frequent intake of highly spiced meals, excessive tobacco etc. might make them prone to get dyspepsia and hyperacidity often leading to formation of peptic ulcers.

SPECIFIC PERSONALITY

However, these factors were not fully accepted as of a major importance in the causation of the disease till recent years, when Alexander and Groen put forward a new hypothesis of the psychogenic nature of these peptic ulcers. They felt that psychic tension in a patient plays an important role in the causation of peptic ulcer. Further, Alexander also observed that not only they have a specific type of psychic tension, but also have a specific personality trait. Such persons usually have a strong urge to receive gratification by their hard work and are usually very sincere and dutiful. Such people readily become frustrated usually if they did not receive the appreciation which is due from their colleagues or superiors.

Similarly, they also become very much disappointed since neither they are successful in their chosen profession, nor they get any appreciation from the society for the service they are rendering to the people. However, such persons do not usually tell their difficulties or disappointments to any one like their friends, close colleagues, parents or marriage partners. They usually keep these frustrating problems to themselves only as a result of an inborn habit of exaggerated self-control. This makes them brood over their frustrating problems all the time leading to increased mental tension and the development of one of the psychosomatic disorders like peptic ulcer in due course of time. Thus, these individuals carry with them a specific personality which makes them more vulnerable and sensitive to get this stress disorder whenever they are exposed
NEUROHUMORAL ENZYMES IN PLATELETS

DATA ARE MEAN ± S E

CONTROL

PEPTIC ULCER

Fig. 57. Shows the neurohumoral metabolizing enzymes MAO and cholinesterase in the platelets which indicate genetic susceptibility of neurohumoral action. Note that in peptic ulcer patients, there is less quantity of MAO, and more of cholinesterase indicating greater turnover of acetylcholine which may predispose them to get Peptic ulcer.

to some difficult and conflicting situation in society. Such specific personality structure of an individual is genetically determined and cannot be changed (Fig. 57). But one can certainly influence those factors which one acquires after birth. Amongst them the conflicting human situation is one of the important factors which cause this disease and hence such a situation will have to be avoided. Groen states: "In this respect peptic ulcer is the result of a 'double level' interhuman conflict. If an individual is frustrated either in his family or in work situation no ulcer will develop; because the social gratification in one field of communication may compensate the frustration in the other. Ulcers arise only in individuals who are frustrated both in their strivings for attention and love reception in their family and in their efforts to obtain social success and gratification in their work". It is clear from this that one is liable to get peptic ulcer if he is considered as a failure in his work situation and if he has frustration and disappointments in the family circumstances.
EXPERIMENTAL STUDIES

In the experimental animals also Selye observed that following acute stress of trauma, infection or emotional disturbance there occurred adrenal hypertrophy, acute atrophy of the thymolymphatic tissues and gastroduodenal ulcers. Selye called all these changes part of general adaptation syndrome which consisted of three stages, viz. (a) alarm reaction, (b) phase of resistance, and (c) phase of exhaustion. According to Hume, all these changes are the result of continuous stimulation from the cerebral cortex, especially from the psychic centre, limbic system, hypothalamo-hypophyseal system, and other neuroendocrinal organs. Even in these various systems, the hypothalamo-hypophyseal system and the adrenocortical mechanism play an important role in causing all these changes seen in chronic stress leading to ulcer formation in the stomach or duodenum. Several Russian workers could also produce experimental neurosis after giving repeated psychic stress leading to severe anxiety states in animals which at first produced functional disturbances in the organs and finally caused peptic ulcer or other stress disorders like hypertension etc. Similarly if the rats are completely immobilised by restraining all their movements, then also one can see the acute superficial ulcers in the gastric mucosa. The number of ulcers increased with the duration of immobilisation. These ulcer were considered to be due to severe psychological stress given all of a sudden. Thus in 24 hours 89% of the animals developed such ulcers. These ulcers healed rapidly when the immobilization experiments were terminated and after 5 days no ulcer could be seen in the mucosa. From these investigations one can conclude that these psychogenic gastric ulcers are due to vascular, nervous and neuroendocrine factors. In such cases, the acute psychogenic stress causes sudden excitation of sympathetic nerves leading to outpouring of catecholamines which causes marked vasoconstriction of the gastric mucosa. If such an ischaemic state is continued for quite some time, superficial ulcers develop promptly in the mucosa of the stomach. However, if the stress is continued for a longer period the outpouring of adrenocorti-
cal hormones also help to perpetuate the ulcers in the gastric mucosa. They possibly produce this effect by increasing the acid peptic secretion and also by reducing the formation of mucus in gastric mucosa. However, all these aspects will be dealt with later on. Suffice it to say here that the acute psychogenic stress can easily produce acute ulcers in the stomach and duodenum within a very short time which can continue to remain there so long as such acute stressful situation continues. However, if such a situation becomes chronic, these experimental subjects may develop the state of adaptation leading to the healing of these ulcers in due course. However, if the adaptation mechanism fails either due to excess of stress or due to exhaustion of adaptation process, the chronic duodenal ulcer may become the sequelae of these chronic stressful states.

CLINICAL OBSERVATIONS

Wolf and Wolff also observed on a patient with gastric fistula that whenever there was an excessive emotional stress there occurred ulcerations in the mucosa of the stomach. These ulcers used to disappear subsequently when this patient went into a state of relaxation. This clinical observation on a living patient clearly indicates that disturbed emotions occurring repeatedly may cause chronic peptic ulcer in susceptible patients. How such changes in emotions can cause stomach ulcers was further studied experimentally and clinically. By stimulating the various centres of midbrain, especially in the hypothalamic region in the experimental animals one can observe hyperaemic changes in the upper gastrointestinal tract, erosion and ulceration in the stomach mucosa. Similarly, as already mentioned, Harvey Cushing also observed perforated gastric or duodenal ulcer in patients who had successfully undergone operation on the hypothalamic region of brain. It is postulated that emotional changes occurring in the hypothalamic region cause the lesion in the organs such as stomach through the autonomic nervous system. As can be expected, such a dysfunction of autonomic nervous system can be divided into that of the sympathetic and that of the parasympa-
thetic. Thus, in excessively predisposed persons with predominance of sympathetic nervous system, essential hypertension and cardiovascular disorders are commonly seen. Persons with predominance of parasympathetic nervous system are more liable to get lesions like peptic ulcer, ulcerative colitis or bronchial asthma.

Here one should also note the types of persons that are likely to get such psychosomatic disorder. Usually they are those who inhibit their outward reactions to stimuli. Normally, if one is attacked physically or mentally one becomes openly angry and shouts at the attacker. If however, such a situation is not followed by outward and visible reactions a chronic emotional tension develops in such a person which would ultimately lead to the development of psychosomatic disorder. Thus the less active is the external emotional manifestation, the more it causes the inner disturbance in the function of autonomic nervous system. Such a chronic functional derangement of the autonomic nervous system leads to the development of psychosomatic symptoms in the first instance followed by actual manifestations of the disease.

There has been much discussion as to why some persons exposed to stress develop peptic ulcer whereas a few others develop ulcerative colitis and still others develop bronchial asthma. Some workers feel that specific emotional disturbances are responsible for causing specific organic lesions in the same way as specific micro-organisms are for causing diseases in a specific organs. Thus the parasympathetic nerves are involved in the body building programme through the anabolic process. The sympathetic nervous system, on the other hand, prepares the person to face the emergency situation demanding fight or flight. Therefore, it stimulates cardiac activity, increases blood pressure and inhibits the anabolic process of the gastrointestinal tract. Therefore the development of a particular type of psychosomatic disease in a given person depends upon his genetically based psychosomatic constitution and also the type of external environmental stressful stimuli. Thus if a person is required to face a stressful situation, but he tries to
escape from it with one excuse or the other, or tries to take the shelter of his relatives or friends, then he is more likely to develop disorders of parasympathetic nervous system, provided his psychosomatic constitution is also congenial to such a development. Such persons are likely to develop peptic ulcer, ulcerative colitis or bronchial asthma. Others who are prepared to face the stressful situations themselves and constantly work within themselves for such a situation, yet due to inhibition or repression of aggressive impulses do not fight, develop excessive sympathetic activity causing some of the functional disorders of the heart, high blood pressure, tension, headache etc.

Hence, the causation of a particular type of disease in an organ of a given individual depends upon his psychosomatic personality type and the type of environmental stress. Here one should remember while planning the therapy for such patients that the genetically based body constitution is a permanent feature of a given individual. But the stressful environmental factors can always be changed by taking various psychotherapeutic and other similar measures.

STRESS AND STOMACH

Whenever there is an excess of stress, there is increased secretion of hydrochloric acid and pepsin in the stomach. This is due to the action of the psychic centre of the cerebral cortex which stimulates hypothalamus via limbic system. In hypothalamus, the anterior part activates the vagus nerve which in turn stimulates stomach to increase all its activities as it is a motor nerve both for the muscles and secretory glands. In addition, the posterior part of hypothalamus stimulates the anterior pituitary gland to produce more of ACTH which helps to put out excess of adreno-cortical hormones. Both ACTH and cortisone also cause excess of acid gastric secretion and reduce the secretion of mucus. It is the combination of all these factors which ultimately leads to the formation of ulcers in the first part of the duodenum (Fig. 58).

In order to prove the above facts a large number of experi-
Fig. 58. Shows plasma cortisol level in peptic ulcer patients. Note the high plasma cortisol level in these patients indicating that chronic psychological stress plays an important role in the persistence of ulcers in these cases.

Mental and clinical methods have been devised especially with a view to find out effective methods of management. It is now well established that the major neurohumoral disturbance that occurs in peptic ulcer is acetylcholine, which is liberated in excess quantity at the nerve endings of both the vagi nerves as a result of stimulation from the centres in hypothalamus which is directly under the control of the psychic centre of cerebral cortex. But thereafter the neurohumoral changes that occur in stomach differ from acute stress ulcers of the stomach seen after burns (curling ulcer) to those of chronic peptic ulcer. In acute ulcers the sudden release of excessive quantity of acetylcholine leads to outpouring of all the other major neurohumors such as catecholamine, histamine and serotonin. Even amongst these three catecholamine plays a dominant role leading to severe vasoconstriction, multiple focal necrosis, and acute ulcer formation in the stomach. These ulcers will gradually heal spontaneously as the excessive neurohumoral response subsides.
Fig. 59. Shows neurohumoral changes in chronic peptic ulcer. Note significant increase in the RBC acetylcholine and histamine contents in these cases with almost no change in the catecholamine level. This shows increased activity of the parasympathetic nerves in these cases.

However, in cases of chronic peptic ulcer, because of the chronic recurrent stressful situations, associated with genetic and environmental susceptibility of a given person, there is a prolonged and sustained acetylcholine response throughout the period. Because of this powerful parasympathetic predominance in these cases, the sympathetic nervous system remains dormant and hence there is a low level of catecholamines and their synthesising enzymes such as DBH (Dopamine B. Hydroxylase) and the degrading enzyme MAO (Monoamine Oxidase) both in the blood and stomach tissues. Similarly, the level of serotonin (5 Hydroxy tryptamine) also remains low leading to dysfunction of gastrointestinal canal. However, another important neurohumoral disturbance seen in this condition is the high content of histamine and histaminase both in blood and also in the stomach tissue. Thus, it is this high acetylcholine and histamine level which is responsible for the prolonged and excessive secretion of acid gastric juice resulting in the maintenance of chronic ulcers in stomach or duodenum (Fig. 59).
Fig. 60. Shows the picture of the herb “Amalaki”.

MANAGEMENT

Unless one understands this basic neurohumoral disturbance, which in fact has neurogenic basis, one cannot really strike upon the correct method of management. Therefore, the mere treatment with antacids to overcome the excess acid secretion in this condition will not be of much avail, unless the disturbance in the psychic and hypothalamic centres is also restored to normalcy. Recent introduction of tranquilizers such as diazepam which has a specification on the hypothalamus greatly helps these patients to overcome their trouble along with antacids and other similar agents. Those measures which restore the psychic centre disturbances to normalcy such
as meditation or relaxation exercise along with other known antipeptic ulcer measures discussed above may also help these patients. The recent introduction of $H_2$ receptor blockers such as metiamide and other similar preparations which would block the action of histamine in stomach may not give a lasting relief unless it is also supported by some centrally acting drugs either at the hypothalamus or at the psychic centre level.

In this connection we have recently tried the fruits of a plant called *Amalaki* (Terminalia amblica) on the chronic peptic ulcer both in the experimental and clinical cases (Fig. 60). In this preparation, dried powder of this fruit is further coated by the juice of the same fruit dried 21 times to make it as an effective concentrated preparation. Two gramme of this powder given three times a day for a period of six to ten weeks usually leads to complete healing of ulcers in about 80% of the cases. Our experience in a series of 94 cases fully convinced us that this drug has a definite place in the management of chronic peptic ulcer.

On a chemical examination of this fruit, we discovered that it has a high content of vitamin C and 5-hydroxy tryptamine. The administration of this drug containing high vitamin C and serotonin might be producing effects both on the central nervous system and on the stomach leading to complete healing of ulcers. The high content of vitamin C in it may be an additional value for the management of these ulcer cases. Recently, Sanjal and his colleagues used another indigenous preparation called “Banana Powder” in these peptic ulcer cases with equally good results. On a chemical examination of banana powder, it was found that it contained a high quantity of serotonin. Thus, it can be said now that the administration of serotonin containing plant products might be having a very beneficial response in the treatment of peptic ulcer which acts both on the central nervous system as well as on the stomach. From these recent studies, it becomes clear that neurohumors play important roles in the causation of chronic peptic ulcer and therefore for their effective management the disturbed neurohumors will have to be brought to normalcy by giving
appropriate medications. Mere use of drugs which will have only local action in the stomach mucosa cannot produce a lasting effect on the ulcers. Hence, there is a great need for reappraisal of our understanding of the pathogenesis of peptic ulcer based on the neurohumoral disturbances. Similarly, our approach to the treatment should also be directed towards bringing down the disturbed neurohumors to normalcy both at the level of central nervous system and also at gastro-duodenal level. Unless we plan and direct our attention to the entire psychosomatic constitution, we cannot fully solve the problem of this common disease.
CHAPTER 19

Ulcerative Colitis

Ulcerative colitis is a very serious disease of the colon which usually occurs after some specific emotional conflict. It can develop in various forms from mild to severe, depending upon the personality and body constitution of the individuals. It is also dependent upon the vulnerability of the colon as a result of certain environmental factors like dietetic imbalance leading to recurrent episodes of diarrhoea or constipation. In the mild form it may develop as irritable colon, and in moderately severe form it may develop as mucus colitis.

There had always been some dispute as to whether emotional disturbances directly produce the disease or they are only one of the precipitating factors for the onset of this disease occurring as a result of some other specific agent. From all the available data and also from our own experience, we are convinced that this disease is caused by intense psychological trauma. Groen put forward the following in support of this hypothesis.

(1) The personality of the patient is such as would always expose him or her to emotional conflict with some “key person” in his or her environment e.g. parents, brothers or sisters, teachers, employers, colleagues or neighbours. We had seen a patient aged 25, in an enlightened family, who was always criticised and humiliated for his minor deficiencies by the parents in the presence of all including his newly wed wife. This situation became so intolerable that he ultimately became a victim of serious type of mucus colitis. All the usual antidysenteric treatments failed to give him any relief. Ultimately he was given a yogic postural treatment (to be discussed later) with complete recovery within 3 months of the commencement of
the treatment. This further confirms that these diseases fall in the group of psychosomatic disorders.

(2) It is also observed that in acute cases, the disease breaks out within 24 to 48 hours after sustaining emotional conflict as a result of humiliation or defeat in the presence of others. Sometimes this humiliation or threat of humiliation occurs as a result of exposure of feeling of inferiority of the individual in his or her function as male or female. We had seen a young, intelligent, and highly sensitive boy whose marriage was fixed to a healthy, wealthy and hefty girl. Every time the date of his marriage was fixed, he would get an attack of severe ulcerative colitis 48 hours before the date. This episode was repeated three times as a result of which his marriage was ultimately cancelled. Here the main precipitating factor for the onset of ulcerative colitis was the intense feeling of apprehension and inadequacy in every respect, due to which he used to get severe nervous breakdown leading to the development of ulcerative colitis.

(3) In these patients, such a humiliation or defeat is not at all manifest or visible to an outside observer. Such inhibition of outward behavioural discharge converts the external emotional trauma into internal conflict situation. It is this emotional conflict within the individual which ultimately produces intensive psychological and neurohumoral changes leading to severe ulceration in the mucosa of colon. As will be discussed later, the intense vasoconstriction of the colonic mucosa as a result of increased secretion of noradrenaline is possibly responsible for the development of acute ulceration in these stressful situations.

**Personality Factors**

In this regard Wolf states: "The relationship of colonic hyperfunction in 19 patients with ulcerative colitis. The subjects were found to be characteristically outwardly calm, superficially peaceful and more than usually dependent. Beneath the calm exterior it became apparent that there was intense hostility, resentment and guilt. Such feelings, when sustained and
unrelieved were associated with hyperfunction of the colon with increased transport activity, increased vascular activity, turgescence and small haemorrhagic lesion. In these patients the manner in which these personality factors of genetic origin and environmental factors operate needs further explanation. It is known that the peristaltic movement of the colon is an autonomic function regulated by the nerve plexuses of Auerbach and Meissner found in the wall of the bowel. These autonomic functions are further regulated by the ganglia in the mesentery and also by the thoracoherember gangli of sympathetic nerves. These nerves can be further influenced by the spinal cord, brain stem and frontal lobes of the cerebral cortex. It seems that in these well known psychosomatic diseases such as ulcerative colitis all these lower regulating centres in the sympathetic and brain stem regions are superseded by psychic centres of the frontal lobe which ultimately exercise their dominating influence on the colon leading to the above stated microcirculatory changes in the mucosa of the colon.

   All these stressful situations at first produce intense hyperactivity of the cerebral cortex leading to excessive outpouring of acetylcholine. This is soon followed by the sympathetic response leading to excessive liberation of catecholamines such as adrenaline and noradrenaline. These changes produce vasoconstriction at the arteriolar and venous level leading to pooling of bloods in the capillaries of the mucosa. Because of the poor circulation in the mucosa with vasoconstriction the mucosa may slough off and stress ulcers may form. This will ultimately lead to profuse haemorrhagic and mucus discharge from the colonic mucosa and ulcers. This is soon followed by absorption of the mucosal cellular materials into the lymphatic channels which act as an antigen to produce antibodies in the regional mesenteric lymph nodes. These antibodies, when released from the lymph node, reach the colonic mucosa via blood stream. There occurs an antigen-antibody reaction of the autoimmune type leading to the development of chronic inflammatory process with marked lymphocytic infiltration. Such an inflammatory process not only perpetuates and
enlarges the ulceration process, but also causes severe inflammatory changes in the neighbouring mucosa. Thus one can surmise from the above, that the severity of these autoimmune inflammatory responses depends upon the intensity of stressful situations and also the susceptibility of the person and his personality traits. As already stated, the personality of these patients is somewhat unique with obsessive-compulsive behaviour. They involve themselves into too much of neatness, indecision, over-intellectualization, rigid morality and anxiety. If such a person with a typical personality trait has a susceptible, sensitive and weak colon, the stressful situation would affect it and produce the above pathological changes. We have observed elsewhere that the susceptibility can be measured by estimating the enzymes which inactivate the major neurohumors—acetylcholine and catecholamines, namely cholinesterases and mono-amine oxidase. By measuring these enzymes in the blood initially and later on in the platelets we have been able to label which type of persons are likely to develop what type of stress disorder. If such susceptible persons are exposed to various environmental factors such as faulty diet and nutrition, their colonic mucosa is likely to be taxed more than any other organ in the body. Therefore, in severe stressful situations, it is their colon which is likely to be affected with stress disorders in view of their susceptibility and also that of the organ concerned. These are some of the hypotheses we have put forward on the basis of our clinical and laboratory observations. However, they need further confirmation.

However, once the disease is fully established, it also influences the patient’s personality. The patient becomes more dependent on others when he or she falls a victim to frequent attacks of diarrhoea, anaemia, dehydration, abdominal pain and an alarming loss of blood in the stools. Because of this the patients are unable to adapt themselves to this serious illness and hence they are likely to become more neurotic. However one should remember that a disease alone cannot make one so neurotic. In fact by nature and from the very beginning of one’s
Fig. 61. Shows the levels of acetylcholine in different types of colitis cases. It is found raised in both functional bowel disorders and ulcerative colitis indicating their neurogenic origin.

Fig. 62. Shows Plasma catecholamine studies in colitis cases indicating no rise of this neurohumor. In fact, there is a slight lowering of catecholamine in these cases.
Ulcerative Colitis

MEAN TOTAL BLOOD HISTAMINE IN COLITIS

Avs B - P>0.05 Insignificant
Avs C - P<0.01 Significant
Avs D - P<0.001 Significant

Fig. 63. Shows a significant rise of Histamine in the functional bowel syndrome and a marked rise in ulcerative colitis cases. It is possibly the hypersensitive reaction that is responsible for producing such a severe inflammatory response in the colonic mucosa.

Life one often develops specific personality traits which on receipt of a certain type of stress makes them victims of this disease. Once this starts, it further aggravates the situation and makes the person more neurotic and dependent on others. From this it is quite clear that the original psychic personality of the individual influenced by various environmental factors, such as nutrition, dietetic habits, etc. makes him susceptible to this disease. However, the exciting cause seems to be a severe stressful situation which involves the release of the neurohumor acetylcholine from the brain, and marked stimulation of parasympathetic nerves especially those supplying the colon and rectum. This leads to severe local reactions in the colon leading to excessive liberation of histamine causing severe inflammations and ulcerations. Therefore, unless we take the totality of this psychosomatic disease as a whole in a neurotic
individual, we will not be able to plan any effective treatment which would give him a permanent and lasting cure (Figs. 61, 62 & 63).

Clinical Features

Clinically the disease has been divided into four distinct types depending upon its onset, course and complications: (1) acute and fulminating, (2) subacute, (3) chronic, and (4) relapsing and recurring. As the name indicates the acute and fulminating type is a very serious condition and the patient may succumb to the disease within a few days of the onset of the disease. In this loose motions are frequent—15 to 30 times a day. They almost always contain blood, pus and mucus. Fever, anaemia and exhaustion are common accompanying features. This is accompanied by tenderness in the entire colonic area together with distension and cramps in the region. The patient gradually becomes very toxic and markedly exhausted and ultimately succumbs to the disease as a result of irreversible endotoxin shock.

The subacute, chronic and relapsing types of colitis also have a similar manifestation but less severe and slow in progress. It usually affects young and middle aged persons of either sex with periodical remissions and exacerbations depending upon the stressful situation. The patient is exposed to life situations periodically. In spite of all these evidences psychological aspects of these patients have been given scant attention and most of the investigators have emphasized the microbiological and pathological point of view with very little success. Therefore, there is urgent need for studying these patients from the psychosomatic angle in order to understand the etiology, pathology and preventive aspects of these conditions.

Management

In all the treatments psychotherapy should play an important role in the management of these patients. Further it was
observed that if the life situations of these patients are changed there may be spontaneous remission of the symptoms. Listening sympathetically to the patient’s problems, giving him constant care and protection and daily interviews should be made parts of the psychotherapy. This should be supplemented by usual medical or surgical treatment. In the medical measures Solizoparin, 2 tablets three times a day and intracolonic administration of cortisone drop along with other supportive measures including blood transfusion if required will help them to get over the trouble temporarily. In the acute, fulminating variety of ulcerative colitis one will many a time be called upon to do total proctocolectomy to save the life of the patient. In all others, one will be able to get relief through medical measures together with other supportive regime. If, however, a good psychotherapy could be added to these surgical and medical measures, one can get lasting relief. Recently, instead of psychotherapy, we added relaxation therapy in the form of Shavasana a yogic relaxation posture, with impressive response.

CASE REPORT

Mr. B., a 50 year old businessman, had been having attacks of loose motions along with mucus and blood for the past 3 years. These attacks had made him completely incapacitated and weak. He started having such attacks after facing some acute conflicts between himself and his business partners. When we saw him, he was weak and anaemic and all our investigations including radiological studies confirmed the diagnosis of ulcerative colitis of chronic relapsing type. We gave him some psychotherapy, medical measures and supportive therapy including two blood transfusions. There was some improvement, but not complete relief. Then we subjected him to relaxation type of Yoga therapy in the form of Shavasana for 30 minutes every morning and evening. He carried on this treatment very regularly for one month with remarkable improvement. Since then we have been following him up for the last 2 years with no evidence of recurrence of any com-
plaints. He has put on his original weight and started doing his business work as usual. However, he is continuing with yogic postures every morning and evening, which according to him keeps his body and mind in perfect order.

From this one can say that in all these cases in the acute phase one will have to give proper medical and surgical tretment as required, to tide over the situation. However, in order to get lasting relief, one will have to resort to some type of therapy such as yogic postures or meditation which would have a tranquilizing effect on the brain. Unless this is added no lasting relief is possible. Since this is a psychosomatic disease, with the main seat of lesion in the frontal lobes of the cerebral cortex, one will have to control this site of lesion with effective measures like Yoga therapy so that further episode could be prevented. So far this aspect of tretment has not been taken into consideration and hence the recurrent episode of the disease leading to enormous miseries of these patients could not be prevented. Since the psychosomatic etiology and pathogenesis are now becoming clear it is high time that a newer approach of management is made to give lasting relief to the patient.

**Mucus Colitis**

It is a condition in which there is pain in the colonic region, defecation disturbances and passage of stool often mixed up with mucus. The defecation disturbances may be constipation with passage of small pellets of stool frequently or it may even be diarrhoea. This condition is also known as irritable colon syndrome, colonic neurosis or spastic colitis.

It is a common condition associated with certain psychic features such as anxiety, nervousness and irritability. It is seen both in men and women in the age group of 15 to 45 years. Commonly it manifests itself as constipation and pain in the left lower quadrant which is often relieved after passage of stool. In more severe cases, excruciating pain, diarrhoeal stools, accompanied by passage of profuse quantity of mucus and
other systemic disturbances are seen. Such severe cases often show features of psychoneurosis also. They often swallow air and this leads to gaseous distension of the abdomen and flatulence. Because of this, these patients become much disturbed about their digestive system as a whole.

The examination reveals that they are usually men of a frail constitution. They show many neurotic manifestations and yet they otherwise look normal. The abdomen looks somewhat distended and on palpation, a tender sigmoid colon filled with faeces can be observed. Their rectum usually remains empty and proctoscopic examination does not reveal anything except some quantity of mucus.

Thus from their history and physical examination, intermittent characteristics of the disability occurring in association with emotional distress, one can arrive at the correct diagnosis. However, it would be safer if various laboratory and radiological investigations are carried out in doubtful cases in order to exclude amoebic dysentery, divertienitis and also neoplastic lesion.

TREATMENT

Since the whole disease has a psychoneurotic basis, the usual medicinal treatment without psychotherapeutic measures would give only temporary relief, if any. If the disease is not controlled by proper measures, it may even lead to ulcerative colitis or malignant lesions. Therefore, proper evaluation of the patient’s psychological problems and appropriate psychotherapeutic procedures must be instituted to overcome his recurrent troubles. A good reassurance and change of environment might help him to overcome his stressful situations. Symptomatic medical measures such as periodical warm saline enema and a daily intake of the husk of ‘Isopgo’ at night might help the patient to overcome the symptom of constipation. The frequent intake of antispasmodic drugs should be avoided to prevent the development of drug addiction. It would be interesting to know that in the past one year, we have been advising these patients the practice of yogic exercises (Hatha Yoga) with
remarkable success. In all we have treated 8 cases and all of them recovered completely from this disease within a period of six months or so.

CASE REPORT

Mr. P.P. aged 24, gave a history of recurrent attack of pain in the left iliac fossa for the past 3 years. Such an attack is usually associated with passage of loose motions containing a lot of mucus. It all started soon after his marriage, which apparently was not a very happy one. The wife was too dominating and assertive. Other members of the family also joined hands with his wife in criticising his activities. This completely isolated him from his family making him a victim of frustration and other emotional disturbances.

Soon he started developing recurrent attacks of pain in abdomen with passage of loose mucus containing stools. This attracted a lot of sympathy for him from everyone including his wife. However, the moment he was all right again, the old situation isolating him from others reappeared. Therefore, he started getting symptoms frequently to get some sympathy from his family members continuously.

On examination there was found a tenderness in the region of sigmoid colon which was palpable. Repeated stool examination did not reveal any abnormality. The proctoscopic and sigmoidoscopic examinations also did not reveal any abnormality except an increased congestion in the region. All the antidysenteric and antispasmodic drugs did not give him much relief. In fact, the intensity of pain continued to increase. Since all the medical measures failed, a possibility of instituting a surgical treatment on the basis of regional colitis was considered but postponed.

In the meantime, a detailed psychological history was prepared which indicated very strongly that it had a strong psychoneurotic basis. Hence, he was asked to practice eight common yogic postures everyday in the morning on empty stomach, followed by breathing exercises. This he started doing very regularly and to our utter surprise his symptoms gradually
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subsided during the next two months and within 4 months they completely disappeared. We have been following this patient for the last 5 years and he has absolutely no such symptoms. In fact, he is leading a very comfortable family life but at the same time he also practices yogic postures regularly in the morning before he goes for work.

We obtained similar results in almost all cases and we are closely watching them for the recurrence of symptoms. From this it appears that mucus colitis is definitely a psychosomatic disorder which can be controlled effectively and permanently by such non-medical measures, as yogic practice. However, it should be remembered that it will have to be practiced regularly throughout one's life, if one wants to get a lasting relief.