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BODILY MECHANICS AND NUTRITION*

BY LLOYD T. BROWN, M.D., F.A.C.S., BOSTON.

It is well recognized that fatigue, as evidenced by a child's becoming all too easily overtired, is one of the most important factors to be dealt with in the undernourished child. With this fatigue there may come as a group or singly a multitude of other symptoms. The child may have a capricious appetite, at times eating very little and at other times inordinately. It is often very difficult to give a well regulated diet because the child will not eat at the proper times and seems to eat best in those periods between meals.

When these children have played too hard or have become nervously over-excited, which seems to happen very easily, what little desire for food there was is lost or, if food is taken, the child may have so-called indigestion attacks associated with pain or vomiting and, in extreme cases, may show all the signs of acute vasomotor collapse or shock. In these cases oftentimes no other cause can be found than the overtire or nervous excitement.

Associated with the difficulty in feeding there is usually found a more or less obstinate con-

stipation and all the symptoms which go with this. These children are subject to colds and oftentimes catch them without any exposure; colds which can be stopped by thorough catharsis.

Perhaps the most difficult thing from the parents' point of view is the disposition of the child. It is very common to consider these children as the nastiest tempered, worst disposed kids that we run up against. They have all the naughtiness of the healthy, normal child plus the tantrums and unreasonable crying spells of the incorrigible.

The physical examination of such children, between attacks, is essentially negative. They are usually delicate and undernourished. The black lines or shadows under the eyes, which are very marked at the time of the attack, are always present to a greater or less degree. The nose and throat condition may or may not be important.

However, if when the examination is made, the child is stripped so that the entire body can be seen from the front, back and side, there are certain points that are very evident. It is these points and the treatment of them that concerns this paper.

Leaving aside for the moment the question of whether the use of the body in bad mechani-

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cal adjustment has any effect on the functions of the body, let us see if there is any reasonable and easy way by which we can judge what is good and what is bad mechanical use. You may notice that I do not use the term posture. The reason is that posture is too loose a term and means a different thing to every one who uses it.

Realizing the differences of opinion and the difficulties of judging good or bad human me-

chanics, three years ago over 700 so-called normal men of the ages 16-22 were examined and tracings were taken of each one. These tracings were compared and were divided into four groups according to the variations which were found. An examination and comparison of these four groups showed certain points of difference which are perfectly constant.

In this chart (Fig. I) you can see these points.

FIGURE I.

Group A 7.5%

Good Mechanical Use of the Human Body.

1. Head straight above chest, hips, and feet.
2. Chest up and forward.
3. Abdomen in or flat.
4. Back usual curves not exaggerated.

Group B 12.5%

Fairly Good Mechanical Use of the Human Body. Note changes from Group A.

1. Head too far forward.
2. Chest not so well up or forward.
3. Abdomen very little change.
4. Back very little change.

Group C 55%

Bad Mechanical Use of the Body. Note changes from Group A.

1. Head forward of chest.
2. Chest flat.
3. Abdomen relaxed and forward.
4. Back curves are exaggerated.

Group D 25%

Very Bad Mechanical Use of the Body. Note changes from Group A.

1. Head still farther forward.
2. Chest still flatter and farther back.
3. Abdomen completely relaxed, "Slouchy."
4. Back all curves exaggerated to the extreme.

In the group marked A, which is called Good Mechanical Use of the Human Body we find: (1) the head is straight above the chest, hips and feet; (2) the chest is up and forward; (3) abdomen is in or flat; (4) back—usual curves are not exaggerated.

In the next group, B, called Fairly Good Mechanical Use of the Body, there are a few slight changes: (1) Head is too far forward; (2) chest is not so well up and forward; (3) abdomen shows very little change; (4) back shows very little change. Anatomically and mechanically the chest must become flat and not be so well up and forward when the head goes forward because of the attachment of the scaleni and the sterno mastoid muscles to the chest and the cervical spine and skull.

In Group 3, which is called Bad Mechanical Use of the Body, the changes are more marked.

(1) Head is forward of the chest; (2) chest is flat; (3) abdomen is relaxed and forward of the chest; (4) back curves are exaggerated.

In the last group, D, Very Bad Mechanical Use of the Body, these four points are exaggerated to the extreme.

If we are to consider the normal, that condition which is found in the average or the great majority of a large group of cases, and if we believe that this normal or average is the correct or best condition, then we are led to think that the C position is the normal or best one, as 55% of the men were of this group. The D group is next, as 25% are such. The B group, third, as 12.5%, and the A group the worst at 7.5%.

In order to find out which groups, the A and B or the C and D, gave a story of more trouble or sickness in the past, certain questions were asked concerning the past histories of the men. The results of these questions showed in brief that the operation for appendicitis had been done $1\frac{1}{2}$ times as often in the C and D groups as in the A and B groups. That $2\frac{1}{2}$ times as many men had been operated on two or more times in the C and D as in the A and B groups. That three times as many men in the C and D groups showed albuminuria as in the A and B groups. That seven times as many men in the C and D groups as in the A and B groups had backaches. In fact, no man in the A and B group complained of backache.

These figures are suggestive and a glance at some tracings (See Fig. II) of the men over-

FIG. 2.—Tracing of men in the A, E, F, who were not able to stand up to the regular work and were sent to a Special Training Battalion.

seas who fell down and were unable to stand the strain also seems to point out that the C and D groups, although they are the average or more than the average, are not the normal, if we mean by the normal as near the perfect as possible.

You have seen the pictures of the children in Dr. Emerson's nutrition clinic and here are a few more which were not from clinics but from well-to-do families.

Compare these figures to the diagram (Fig. I) and notice the four points: (1) The position of the head; (2 and 3) the shape of the chest and the abdomen and the relation of each to the other; and (4) the curves of the back. These make up the picture which we all recognize as fatigue.

The treatment of such children may, of course, be very simple if it is aimed only at relieving an acute condition. One change in the usual daily routine may be all that is necessary. This may be accomplished by a better regulation of the diet; by more attention to the bowels; by removal of tonsils or adenoids or other obstructions to breathing; by correct-

ing faulty vision or eye strain or by giving the child more periods of rest. In a certain number of cases, however, all of these methods fail to bring results. It is in these cases especially that an appreciation of the principles of bodily mechanics and a knowledge of the ways to improve them may be a very great help to the physician.

The entire treatment from this point of view is based on the idea of giving as much rest as possible to all parts of the body and especially to the thoracic and abdominal viscera. It is, of course, most important that this should be accomplished without keeping the child in bed or lying down much of the time. From a mechanical point of view a child using its body in the D position with the chest so very misshapen must have, to mention only one of the many changes for example, a very marked change in the kind of respiration. The breathing in such a child is usually very shallow and very largely abdominal. From an anatomical point of view, the act of breathing should be about equally divided between the intercostal muscles and the diaphragm. In such a misshapen chest as this child has, this equal division is seldom found, because the effort necessary to raise the chest at each inspiration is too great. Therefore the diaphragm must take on the work, but the diaphragm also is at a disadvantage in that it does not get its proper support, owing to the relaxed abdominal wall and the misshapen chest.

In this relation a fluoroscopic study of the diaphragm and chest is very interesting. Such a study, when the mechanics of the body is appreciated brings out some very interesting points. It is known, for example, that in the slender type of individual especially, there will be a definite change in the position and the shape of the heart in the lying and standing positions. In the slender individual also the position and the excursion of the diaphragm in the ordinary respiration in its relation to its position in full inspiration and full expiration differs markedly in the lying and standing positions.

It is, however, not so well known, because of the greater difficulties in making such an investigation, that this change is not so marked in a slender individual with good bodily mechanics as it is in one of the D group. In the

D group, which we recognize as that of ptosis, the diaphragm in the neutral or natural standing position is at the same level as or much nearer to the position of full inspiration, which is, of course, its lowest point, than it is in the A group. The excursion of the diaphragm in natural breathing is also much smaller. This, of course, means the ordinary breathing is shallow, a condition which is found clinically.

With these conditions in mind, without mentioning any others, such as may occur with the heart and the abdominal viscera, is it not advisable when we prescribe rest periods to begin these periods by putting the children in a position which will make them not only breathe more correctly but which will put their bodies into as nearly as perfect a mechanical position as possible? Such a position is accomplished by placing the child on a firm bed or couch and putting a pillow under the back so that it forces the ribs into a fully expanded position. Such a position, after a time, becomes very restful. Lying on the face with a pillow under the lower abdomen and hips is another very good position for getting concentrated rest.

How can this rest be accomplished when the child is up and around? It is here we come up against the much debated question of exercises and braces. The tremendous importance of regulating the child's daily routine to within his physical endurance is well known. This, of course, is very necessary. With it should go an attempt to educate and train the child to use its body in better bodily mechanics. Sometimes this can be done by educational exercises alone and at other times it is necessary to help out this education by means of some support. Just what system of educational exercises and just what kind of a support is needed is entirely a matter of personal opinion. The point is, does the education and does the support tend to produce the result of keeping the child from getting into the extreme fatigue position and getting overtired? If they do not do this, then they had better not be given.

From the point of view of bodily mechanics the first essential point of any educational exercise should be to teach the child how to use its body correctly. The child should be shown

what the correct use of the body is and when it has accomplished this how to do the ordinary daily tasks, such as walking, sitting, writing, picking up things from the floor, etc., with the body all the time in good mechanical alignment. It should be taught that the correct way is not one single position, but it is a great variety of positions, none of which are exaggerated either in over correction or relaxation. The idea that throwing the shoulders back is the way to get the correct position should be discountenanced, as it is entirely erroneous and leads to a much exaggerated position. If, with this training, the child continues to slump because it is too tired, then a support should be applied; one which will be pliable and will not limit the spinal motions entirely but will tend to keep the child from getting into the extreme positions.

Here are some tracings taken of a patient at the posture clinic of the Massachusetts General Hospital (Fig. III). This tracing shows

Fig. 3.—Typical example of the mal-nourished child. The lines above the head are tracings of the costal angle taken in the natural standing position and in full expansion of the chest.

the lateral view and also the size of the costal angle of the ribs. The inner line is the natural angle; the outer one is the full expansion. There is no difficulty in grouping this child in the D class.

The second tracing (Fig. IV) shows what happened after three months' work twice a week at the clinic and daily work at home by herself. Note the change in the shape of the

FIG. 4.—Same child as Fig. 3 after three months' educational work. The lines above the head are the rib angles.

abdomen and chest. The second tracing shows a strong properly acting abdominal muscle; the contraction coming entirely below the umbilicus, where nature arranged the muscles to give the greatest strength and support. Note also the change in the costal angle in the two positions, natural and full expansion. The circumference of the chest at the xyphoid was, at the beginning $23\frac{1}{2}$ inches in the natural standing position and in three months was 25 inches. The depth of the chest at the xyphoid was five inches and in three months $6\frac{1}{4}$ inches. The child's height was 4 feet, $3\frac{3}{4}$ inches. Her first weight was 57 and last weight 59 pounds. No supports were used. It was possible to educate her to hold herself without the need of them.

In a paper of this length it is possible to mention only very few of the changes which occur with the improvement of bodily mechanics as a whole. What happens to the heart, digestion and other functions as well as to the disposition, cannot be touched upon now other than to say that the improvement is general.

A criticism of such a line of treatment is sometimes made in that it is so slow and takes so long. The only answer to this is that the training of the mind takes years. Some children's minds train more easily than others. The same is true of children's bodies. When we consider that a healthy body tends toward a healthy mind the length of time required for training seems much less important.

An examination such as was made of the Harvard students and the results of putting these D men to hard work in the war shows very definitely that this training should begin with our young children and that it is up to the pediatric and the orthopedic branches of the profession to see that it begins there.

ILLEGITIMACY—FROM THE STAND-POINT OF THE PHYSICIAN.

By FOSTER S. KELLOGG, M.D., BOSTON.

THE problem of illegitimacy is very large and many sided. It presents itself more or less constantly to the practicing physician both in his capacity as medical adviser and as counselor to his community.

On the staff of the Florence Crittenton Hospital for several years, I have been brought in contact with illegitimacy in some of its medical and social aspects and have given some thought to the problem. The purpose of this paper is to present, briefly, to the medical profession of this community, certain facts which I have observed during this time and certain ideas, based on these facts, which may be of value to the physician not in contact with this work, but brought face to face with it from time to time, and requiring then some special knowledge to make what, for the person involved, must be a very important decision.

Overlooking these cases in which marriage is advised and carried out, and those cases in which the parents of the woman are content to give her their best aid and comfort by keeping her with them through pregnancy and labor, we come to the larger side of the problem—the girl who must, for one or another obvious reason, be looked after, in whole or in part, by an agency outside of the home.

There are various agencies in this community which make it their sole or part of their business to look after the girl illegitimately pregnant. The detail of these agencies, the minor difference in their purpose, policy, and method need not concern us. They all embody, however, one of two main ideas. One is that, in general, institution care is best for illegitimates; the other, that boarding out in suitable, investigated homes is best—both admit that there are exceptions from each point of view.

These two points of view are well defended