

Childhood obesity

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Childhood obesity has become one of the more alarming nutritional problems plaguing the American population, with estimates as high as 25% of all children being obese. Aside from obesity's associated risks, there are psychosocial and emotional burdens carried by obese children as well. Clinicians are encountering many of these children in their clinics everyday for other reasons and yet are failing to address the issue of obesity. The problem is not so much that physicians are not recognizing it, but rather that they are ignoring it, especially if the parent or child is unaware that there is a problem. Unfortunately, much controversy exists regarding the treatment of childhood obesity. This article attempts to sort through the myriad issues surrounding childhood obesity and to dispel some of the rumors and myths surrounding this subject.

(Key words: Obesity, body fat, children, pediatric patient, psychosocial issues, emotional issues)

It is estimated that as many as 25% of all children are obese.¹ Obesity is defined as an excess of body fat over a particular norm. Multiple ways exist to quantify this entity. One of the more popular ways to measure obesity in children is by the combination of triceps and subscapular measurements and weight for a particular height measurement.² Triceps and subscapular skinfold measuring greater than the 80th percentile and weight for height measuring more than the 70th percentile for age and sex are defined as obesity in children.²⁻⁵ These measurements are generally done using caliper measurements of skinfold thickness.⁴ Adolescents are measured the same as adults, wherein excess body

fat being more than 20% of total body weight in males or more than 30% of the total body weight in females is defined as obesity.²

Other ways to measure body fat is through the use of the body mass index (BMI, or Quetelet's index of body weight).⁴ The BMI is calculated by dividing the weight in kilograms by the height in square millimeters (or weight in pounds multiplied by 705, then divided by the height in inches). A BMI equal to or greater than 30 in both males and females equals obesity.⁶

Incidence

In the United States, 15% to 20% of all school-aged children are considered obese.² In the past few decades, the prevalence of obesity among children and adolescents has significantly increased.⁷ This increase is seen among all races and both sexes,⁸ although it is seen most often in pubertal girls.⁴ In recent years, there has been greater than a 95% increase in extreme obesity in children between the ages of 6 and 11 years¹ and more and more obesity is seen in children

at younger ages.⁹ In the United States, obesity is more common in the minority population, especially among Native-American and Hispanic adolescent girls, and the African-American population.¹⁰

Risk factors and pathophysiology of obesity

It is well known that both genetics and environment play important roles in the pathogenesis of obesity. Obesity originates in the chronic energy imbalance between energy intake and energy expenditure.⁶ The energy balance equation is as follows:

$$\begin{aligned} \text{Energy intake} - \text{energy expenditure} \\ = \text{Change in energy stores}^6 \end{aligned}$$

Daily energy expenditure has three major components:

- ☐ basal metabolic rate,
- ☐ thermic effect of food, and
- ☐ the energy cost of physical activity (broken down to 70%, 10%, and 20% to 40% of daily energy expenditure, respectively).⁶

If energy intake exceeds energy expenditure, the extra calories are stored and weight gain results as body fat stores increase.¹ Obesity results from an increase in the number of adipocytes, or increase in size of adipocytes, or a combination of both.⁴ Once formed, the number of adipocytes cannot be diminished.⁴ It is postulated that this fact is the reason persons with childhood-onset obesity have difficulty losing weight.⁴ Theoretically, excess energy intake of 100 kcal/d will result in a 10-pound weight gain in 1 year.¹¹

There are various explanations for the positive energy balance in obese children. It was proposed that obese children eat more, exercise less, and have lower energy expenditures than their leaner counterparts.^{1,4} However, studies have shown just the opposite: obese children actually eat less, exercise the same, and have equal or higher resting energy expenditure than leaner children.^{1,11} However, confirmatory studies are lacking, and there is some evidence that obese children tend to underreport what they actually consume.¹⁰

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Genetic factors

As mentioned earlier, genetics and environment both play a part in the pathogenesis of obesity. However, these two seemingly distinct entities are actually hard to separate as members of the same family not only share the same genes, but also share the same kind of environment (including diet, exercise, cultural beliefs, and lifestyle) that may lead to obesity.^{4,6} Stunkard and associates,¹² in their study of twins, brought up apart or together, found that around 70% of the difference in BMI was secondary to genetic factors whereas the remaining 30% was attributed to the environments unique or "non-shared" by the twins. Studies done on adopted children which compared their BMI to that of their biologic and adoptive parents show that their weight is related more to that of their biologic than to their adoptive parents.⁶ Most of the studies emphasize that genetics play the major role in the differences in body weight within a relatively stable and uniform environment.⁶ Studies have shown that if both parents are obese, the child has an 80% chance of becoming obese.⁹

There also seems to be a critical period during fetal development that might predispose the child to obesity. In a study of pregnant women who were exposed to famine, these women's children were found to have a higher incidence of obesity if their mothers were exposed to famine during the first two trimesters of pregnancy as opposed to the last trimester or the first 3 months of life of the infant.¹¹ Therefore, what the fetus is exposed to in the first few months of pregnancy may have an effect on later chances of obesity.

Environmental factors

Some of the environmental factors that play a role in obesity are the psychosocial factors—including level of income, education, and diet.¹⁰ The lower the income and level of education, the higher the risk of obesity (especially among white women).¹⁰ Dietary fiber intake seems to have an inverse correlation with obesity. Obesity is found to be rare in countries where dietary fiber intake is

high.¹⁰ But whether the scarcity of obese people in these countries is related to the high-fiber diet, or if it's the increased physical activity found in these countries coupled with the low-fat content of their national diet (instead of the higher fiber content per se) remains to be proved.¹⁰

Obesity has also been linked to physical inactivity, but results are still inconclusive. A study by Wolf and colleagues¹³ looked at race- and age-related differences in activity, inactivity, and obesity among a multiracial sample of girls in a northeastern town. They found substantial differences with regard to physical activity by ethnicity, with Asians and Hispanics found to be the least physically active. Physical activity also varied by age in that total and strenuous activity decreased with age. Obesity was found to be highest in blacks and lowest among Asians. This age- and ethnicity-related variation seen with obesity may be related to cultural differences in the perception of physical activity and obesity.¹³ For instance, Asians and Hispanics may not view strenuous physical activity as womanly, or they may view academics as more important than being physically active.¹³

There has been shown to be a weak to moderately significant association between both a rapid weight and height gain in middle childhood and several temperamental characteristics.^{14,15} These temperamental characteristics may include distractibility, as well as changes in activity, adaptability, mood, and attention span.¹⁵

Incidence of obesity also varies by geographic location. More obesity is found in the northeastern areas of the United States compared with the midwest, south, and western portions of the country, and within each region, the prevalence of obesity varies by season.¹⁶ Thickly populated urban areas show increased numbers of children compared with rural and suburban areas.¹⁶ For example, inner-city school children seem to have an increased incidence of obesity.³

It is theorized that the availability and pricing of low-caloric-type foods

such as fruits and vegetables are dependent on the region, season, and population density and this situation may contribute to the regional variations seen with obesity.¹⁶ In African-Americans, the socioeconomic level and race are significant factors in determining their nutritional status.¹⁷ The lower the socioeconomic level, the higher the risk for obesity.³ Thus, the trend seems to be to shift away from a problem of malnutrition to a problem of overnutrition³ and in essence, poor nutrition. Children in impoverished communities may lack access to high-quality foods secondary to economic hardships, and their physical activities may be limited to smaller areas where it is safe to play—areas that are debris- and violence-free.³ Furthermore, lack of after-school programs and physical activities can lead children to spend more time in energy-conserving types of activities such as television viewing.^{1,3,7,18} Therefore, when children come into the physician's office with signs of obesity, an assumption of good nutrition should not be made as the obesity could very well result from poor nutrition.

Numerous studies have been done trying to discover connections between childhood obesity and television watching. Television viewing has been linked to obesity because of the fact that children who watch television may spend less time doing energy-intensive types of physical activity and eat increased amounts and more of the unhealthy types of foods, such as those advertised on television.^{1,7,18-21} One study suggests that it is the decreased activity levels that may be attributable to television watching that is the cause of the increase in obesity in children because studies show that energy intake among children and adolescents have not changed,⁷ whereas the number of hours spent watching television has been on the upswing.

Studies have also shown that the metabolic rate or resting energy expenditure was lowered significantly in children who watch television^{1,22} and that direct correlation exists between television watching and the prevalence of obesity among children and adolescents.²³ It is estimated that each hour of television

correlates with a 2% increase in the prevalence of obesity.²³

Despite the overwhelming data linking obesity and television watching, there is still some question with regard to whether it is television viewing that causes obesity or if obese children just watch television more.¹⁰

Parental lifestyle was also found to be significant predictors of their children's body weight. One study showed that children of retired military personnel were more likely to be obese compared with children whose parents were still on active military duty.⁸ Lack of pressure in keeping fit, dietary changes, and lifestyle changes may contribute to this finding.

Obviously, obesity is a complex and multifactorial disease in which more than one factor comes into play. Thus, as clinicians, we need to identify those factors that are modifiable—particularly diet, physical activity, and television watching—and counsel families regarding keeping physically fit, eating well-balanced meals, and encourage more family-oriented activities to encourage maintenance of an appropriate weight.

Complications of obesity

Childhood obesity is associated with a number of documented health risks. One of the most important is the cardiovascular risk.²⁴ More than 90% of obese adolescents have hypertension with elevated serum triglyceride levels, lowered high-density-lipoprotein (HDL) cholesterol levels, and increased total cholesterol levels.^{2,16,25} It is thought that hypertension stemming from obesity is due to selective insulin resistance^{2,26} and that blood pressure in childhood is predictive of blood pressure in adulthood.²⁷ Obesity is also the main cause of hypertriglyceridemia in children without any other risk factors or conditions that may cause secondary hypertriglyceridemia.^{2,26}

Other associated health risks of obesity, aside from increased blood pressure,²⁶ are non-insulin-dependent diabetes mellitus, stroke, coronary heart disease, gallstones, gout, and some types of cancers, including breast and endometrial cancers.^{4,6,16,27} It is also estimated that 80% of obese adolescents go on to

become obese adults,²⁸ but only a weak correlation exists between obesity in early childhood and obesity in adulthood.^{4,11,29}

Dermatologic disorders (such as acanthosis nigrans, intertrigo, and fragilitas cutis inguinalis),⁴ orthopedic injury (such as slipped capital femoral epiphyses and Blount's disease), psychosocial developmental morbidity,¹⁶ and decreased exercise tolerance are also other problems associated with childhood obesity.^{28,30} Menstrual abnormalities that can be associated with obesity include anovulation and polycystic ovaries by influences on estrogen synthesis or storage.^{5,8}

Perhaps the most important complications of childhood obesity, however, are the intangible ones—that of the emotional and psychosocial effects of obesity. Obese children are least likely to be befriended by preschoolers,¹⁶ and they have poor self-image, and feelings of inferiority and rejection.⁴ Cultural messages of inferiority and negative self-image do not become internalized until the child reaches adolescence.^{11,16} This may be one of the more important reasons childhood obesity should be prevented. The emotional scars that these children may carry can last throughout their adult life and influence the way they think and perceive themselves.

Diagnosis

After evaluating the obese child through a detailed history and physical examination, and assessing the risk factors for obesity, the pathologic causes of obesity—because of their other medical sequelae—need to be ruled out first.⁴ Pathologic causes of obesity include endocrinopathies such as hypothyroidism, Cushing syndrome, and hyperinsulinism, as well as congenital syndromes such as Prader-Willi syndrome.⁴ Note that less than 5% of obese children will have a pathologic cause for their obesity; the majority will have exogenous obesity.⁴ Important risks for obesity include parental obesity, weight for height greater than the 75th percentile, weight for height increasing two percentiles, or a poor feeding relationship.⁹

If the child otherwise has a negative history for an endocrine disorder, no abnormal findings at physical examination, and has maintained a growth rate for height greater than the 50th percentile without any signs of an endocrinopathy, a diagnosis of exogenous obesity could be substantiated without laboratory studies.⁴ Laboratory studies need to be performed only if growth failure, delayed development, persistent hypertension, headaches, or a family history of hypercholesterolemia or cardiovascular disease is present.⁴

Management of obesity

An obese child with a family history of obesity may be at increased risk for the development of adult obesity compared with the obese child with a negative family history for obesity¹¹ and thus may warrant a more aggressive approach to prevention and treatment. Early detection and prevention therefore is very crucial, as once obesity is established, it is often not amenable to treatment.^{4,30} The earlier obesity is recognized, the easier it is to intervene.³⁰ Davis and associates,³⁰ in 1994, showed that “treatment early and often may be best.” Assessment for childhood obesity begins on the first visit to the physician's office.⁴ All children seen in the physician's office should have regular weight checks, with weights for height plotted on the growth charts.⁴ Regularly plotting weights, inquiring about dietary and feeding practices, and addressing problems as they occur make prevention and treatment more effective.³⁰

Prevention

When the patient presents with early signs of obesity, the family should be counseled regarding methods for preventing obesity.⁴ At birth, only emphasize positive feeding practices as obesity in infancy has no correlation with adult obesity.⁹ At the same time, counsel parents about when to start solid foods and how to avoid force-feeding infants.⁹ The clinician should consider delaying introduction of solid foods until the child reaches 4 to 6 months of age⁹

and encourage mothers to breastfeed for as long as possible.⁴ The parents should be counseled to never restrict fat in the diets of infants and young children; restricting fat to approximately 30% of the calories is acceptable only after the child reaches 2 years of age.²⁹ The parents should also be counseled to never give skim milk to children younger than 2 years^{4,9} and not to use food as a pacifier, reward, or punishment.⁴

At 1 year of age, children can be switched from infant formula to cow's milk and other beverages.⁹ When the child is between 18 months and 3 years of age, the clinician should remind parents that child-sized portions are approximately a quarter to one third of an adult portion, or one tablespoon per year of age.⁹ Sixteen ounces of milk with an ounce of meat per day will provide the necessary amount of protein for a child 1 to 3 years of age.⁹ The clinician should closely monitor the child for any disproportionate weight increases between the ages of 1 and 5 years of age as this is the time when the tendency for obesity begins to appear.⁹

For older children, a good starting point will be to advise parents to limit dietary fat to around 35% of the total calories consumed by switching to low-fat-content foods and cutting down on high-calorie snacks.¹⁶ Regularly counsel families about avoiding junk food, cutting the fat, and increasing fiber intake.⁴ With the possible association between television viewing and obesity, the clinician should also counsel parents about limiting the number of hours their children watch television.¹⁶ Practical advice to relay to parents is to limit television viewing to a maximum of 1 to 2 hours per day.

Treatment

Once the diagnosis of obesity has been established, the child can begin a more structured approach to losing weight. There are four basic approaches to the management of childhood obesity. They are prevention (discussed previously), weight loss, exercise, and behavior modification.^{2,30,10} Following is an outline of each of the major points:

Weight loss

Weight loss alone will decrease the cardiovascular risks by its associated decrease in blood pressure and correction of lipid abnormalities.^{2,24} However, induced weight loss in children is still somewhat controversial as the long-term effects and safety of caloric restriction in growing children is still being debated.¹⁰ One study looked at the effect of weight loss by obese children aged 6 to 12 years on their long-term growth, and it was found that reduced-energy diets did not affect their long-term growth significantly.³¹ However, for some growing children, weight loss might be undesirable. For instance, adolescents, in particular, have a tendency to have poor diets, poor nutrition, and are at a critical time for growth spurts, so it is very difficult to estimate what kind of energy and nutritional needs they have.^{5,9} Therefore, maintaining the weight for a few months or decreasing the rate of weight gain might be more beneficial for such children.^{4,9} This maintenance can be accomplished by avoiding snacking, fast-food meals, and fad diets. Teens need to be warned *not* to purchase over-the-counter diet pills, as well.

The appropriate diet is a low-fat, low-salt diet. Fat in the diet should be decreased to about 35% of the total calories consumed.¹⁶ A high-fiber diet should not be the main modality for weight control as studies confirming that a low fiber diet is a cause of obesity are still lacking.¹⁰ The most recent recommendation for daily dietary intake (DDI) of fiber for children is as follows: The range of grains of fiber for children aged 3 to 20 years equals the child's age plus a minimum of 5, or a maximum of 10 (for example, 7 g/d to 12 g/d for a 2-year-old) until the age of 20; thereafter, the recommended DDI is 25 g/d to 35 g/d.^{31,32} The diet should also include enough protein, carbohydrate, minerals, fat, and vitamins to meet the child's growing needs.⁴ Adolescent weight reduction diets should not go below 1200 calories/d to provide adequate vitamins and nutrients for normal growth and development.² This is where family support can be helpful. If the whole fam-

ily adjusts its diet, the child will have an easier time altering his or her own eating habits.⁴ Rocchini² recommends putting the child on a 2-week trial diet first and, if he or she is successful, he or she is likely to benefit from a weight loss program.² If the patient fails to lose weight, the family and child are counseled and told to return in 3 to 6 months if motivation changes.²

Children on a weight loss program are to be checked as frequently as every 2 weeks. This schedule enables the caregiver to check for problems (such as delayed growth and development) as they occur, promote motivation, and offer ongoing support.

In regard to medications, the anorectic drugs or chorionic gonadotropins do not have a place in the treatment of childhood obesity.⁴ Parents need to be informed that these drugs are dangerous and do not work. For physicians who insist on using these drugs, they must be reminded that phentermine and fenfluramine are not recommended for children less than 12 years of age.³³

Last, surgery, it is thought, has no place in the management of childhood obesity.^{2,4}

Exercise

The obese child is encouraged to exercise for 30 to 60 minutes, 3 days a week.² On each clinic visit, the clinician should always ask about what kind of physical activity the child engages in. The practitioner should encourage the child to spend less time watching television as limiting television viewing will indirectly cause less snacking and less inactivity.⁷ Family-oriented type of physical activities again are more helpful as this increases compliance.

Behavioral modification

When behavior modification is available, the child involved in a weight loss program should also be involved in this modality. The child should attend classes designed to promote good nutrition, record keeping, and provide reinforcement of altered behavior.² This approach helps the child accept responsibility for his or her eating behavior and be aware

of current habits.² Clinicians also play critical roles in fostering compliance. Regular and frequent follow-up visits by a caring, sympathetic health professional are helpful in reinforcing motivation.^{4,16}

Family support is very critical to give the child structural support and provide appropriate reinforcement as the child makes dietary and lifestyle changes.^{2,9} Most families are aware of the child's problem, but some families, owing to internal conflicts and family dynamics, may be hesitant to talk about the problem, or may even be defensive about it, especially if one or both parents are obese themselves.¹¹ One must never exert undue pressure or impose personal beliefs onto the family as to do so might jeopardize what the physician is trying to achieve. Programs that target the whole family (both parent and child) are more likely to succeed than programs targeted at the child alone.^{11,16} However, as with anything to do with the child, if the child does not lose weight, or refuses to lose weight, no diet or weight loss program will lose the weight for him or her.² At this point, the clinician should help the child see the importance of striving for good health, help the child to like and accept himself or herself, and help the parents to do the same.⁹

Last, obesity that does not respond to outpatient therapy or the presence of underlying medical problems or psychological problems constitutes indications for referral to special services.³⁰

Comment

Obesity has become one of the more important nutritional and health concerns affecting the pediatric population, but most clinicians are still not very vigilant about screening for it. It is time that physicians start recognizing and detecting this segment of our patient population. Childhood obesity is a very complex and multifaceted disease. Many health risks are associated with obesity, not forgetting the stigma that accompanies it as the child goes through the already difficult process of growing up. It is the clinician's job to provide the necessary surveillance for early signs of

obesity and prevent this condition from advancing by instituting the good dietary and behavioral changes necessary to maintain this lifestyle. By providing regular, frequent, ongoing support and allowing the family to participate in all aspects of care, the goal of preventing and managing obesity can be accomplished. This is one of the very few instances in which intervention in childhood has very significant effects in decreasing adult morbidity and mortality, and one that should be taken advantage of. Clinicians should not miss this great opportunity to stop this very preventable condition from becoming an adult disease.

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References

- Klesges RC, Shelton ML, Klesges LM. Effects of television on metabolic rate: Potential implications for childhood obesity. *Pediatrics* 1993;91:281-286.
- Rocchini AP. Adolescent obesity and hypertension. *Pediatr Clin North Am* 1993;40(1):81-92.
- Okamoto E, Davidson L, Conner D. High prevalence of overweight in inner-city schoolchildren. *Am J Dis Child* 1993;147:155-159.
- Leung AK, Robson WL. Childhood obesity. *Postgrad Med* 1990;87(4):123-133.
- Paige DM. Obesity in childhood and adolescence. *Postgrad Med* 1986;79(1):233-245.
- Ravussin E, Swinburn B. Pathophysiology of obesity. *Lancet* 1992;340:404-408.
- Gortmaker SL, Must A, Sobol AM, et al. Television viewing as a cause of increasing obesity among children in the United States, 1986-1990. *Arch Pediatr Adolesc Med* 1996;150:356-362.
- Tiway CM, Holguin AH. Prevalence of obesity among children of military dependents at two major medical centers. *Am J Pub Health* 1992;82:354-356.

9. Bedinghaus J, Doughten S. Childhood nutrition: from breastmilk to burgers. *Prim Care Clin Office Prac* 1994;21:655-672.

10. Kimm S. The role of dietary fiber in the development and treatment of childhood obesity. *Pediatrics* 1995;96:1010-1014.

11. Bandini L, Dietz W. Myths about childhood obesity. *Pediatr Annals* 1992;21:647-652.

12. Stunkard AJ, Harris JR, Pederson NI, McClearn GE. The body-mass index of twins who have been reared apart. *N Engl J Med* 1990;322:1483-1487.

13. Wolf AM, Gortmaker SL, Cheung L, et al. Activity, inactivity, and obesity: Racial, ethnic, age differences among schoolgirls. *Am J Pub Health* 1993;83:1625-1627.

14. Carey WB. Temperament issues in the school-aged child. *Pediatr Clin North Am* 1992;39:569-584.

15. Carey WB, Heguik RL, McDevitt SC. Temperamental factors associated with rapid weight gain and obesity in middle childhood. *J Dev Behav Pediatr* 1988;9(14):194-198.

16. Dietz Jr WH. Prevention of childhood obesity. *Pediatr Clin North Am* 1986;33:823-833.

17. Garn SM, Clark DC. Nutrition, growth, development, and maturation: Findings from the Ten-State Nutrition Survey of 1968-1970. *Pediatrics* 1975;56:306-319.

18. Dietz WH, Gortmaker SL. TV or not TV: Fat is the question [comment]. *Pediatrics* 1993;91:499-501.

19. Valerio M, Amodio P, Dal Zio M, et al. The use of television in 2-to-8-year-old children and the attitude of parents about such use. *Arch Pediatr Adolesc Med* 1997;151:22-26.

20. Robinson T, Hammer L, Killen J, et al. Does television viewing increase obesity and reduce physical activity? Cross-sectional and longitudinal analysis among adolescent girls. *Pediatrics* 1993;91:273-280.

21. Leung A, Lim S, Robson W. Children and television. *Am Fam Physician* 1994;50:909-916.

22. DuRant RH, Baranowski T, Johnson M, et al. The relationship among television watching, physical activity, and body composition of young children. *Pediatrics* 1994;94(4):449-455.

23. Dietz WH, Gortmaker SL. Do we fatten our children at the television set? Obesity and television viewing in children and adolescents. *Pediatrics* 1985;75:807-812.

24. Becque MD, Katch VL, Rocchini AP, et al. Coronary risk incidence of obese adolescents: Reductions of exercise plus diet intervention. *Pediatrics* 1988;81:605-612.

25. Williams DP, Going SB, Lohman TG, et al. Body fatness and risk for elevated blood pressure, total cholesterol, and serum lipoprotein ratios in children and adolescents. *Am J Pub Health* 1992;82:358-363.

26. Rocchini AP. Adolescent obesity and cardiovascular risk. *Pediatr Annals* 1992;21:235-240.

27. Hammer LD. The development of eating behavior in childhood. *Pediatr Clin North Am* 1992;39:379-394.

28. Figueroa-Colon R, von Almen K, Franklin FA, et al. Comparison of two hypocaloric diets in obese children. *Am J Dis Child* 1993;147:160-166.

29. Hardy S, Kleinman R. Fat and cholesterol in the diet of infants and young children: Implication for growth, development, and long-term health. *J Pediatr* 1994;125(suppl):S69-S77.

30. Davis K, Christoffel KK. Obesity in preschool and school-age children. *Arch Pediatr Adolesc Med* 1994;148:1257-1261.

31. Epstein LH, Valoski A, McCurley J. Effect of weight loss by obese children on long-term growth. *Am J Dis Child* 1993;147:1076-1080.

32. Williams CL, Bollella M, Wynder EL. A new recommendation for dietary fiber in childhood. *Pediatrics* 1995;96:985-989.

33. Fledman EB. Dieters may cut out more than calories [comment]. *Consultant* 1996;36:2133.



Medical education

Training osteopathic geriatric academicians: Impact of a model geriatric residency program

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The need for osteopathic geriatric academic leaders who are educators and researchers is well recognized. The University of Medicine and Dentistry of New Jersey-School of Osteopathic Medicine's Geriatric Residency Program, a federally funded Faculty Training Project in Geriatric Medicine and Dentistry, has served as a model program in the osteopathic medical profession since its inception in 1989. Targeting internal medicine and family medicine physicians interested in academic careers in geriatrics, the program promotes interdisciplinary training, which develops clinical, research, and teaching/administrative skills.

A survey of program graduates assessed their perceptions about the field of geriatrics and the impact of training on career choice and level of satisfaction. Results indicated that 100% of the former trainees entered the field of geriatrics; 57% hold full-time faculty appointments at an osteopathic medical school, and 43% practice as clinical geriatricians. Of those in an academic setting, all taught medical students and housestaff and were involved in research. All the respondents were satisfied with their career choice, although 71% indicated that a higher salary and greater respect for the discipline would further enhance their satisfaction. Greater than half perceived a need for additional geriatricians and ranked complexity of care, lower salaries, inadequate reimbursement, and indebtedness after medical school as significant barriers to entering the field.

This program has been successful in training academic geriatricians, it has created role models for students, and it has responded to the shortage of osteopathic academic and clinical geriatricians. Financial incentives and reimbursement that is commensurate with complexity of care would serve to attract more trainees to this important primary care discipline.

(Key words: Geriatric fellowship training, geriatric education, academic geriatric medicine, faculty development in geriatrics)

Much has been written during the past two decades regarding the healthcare needs of the geriatric population in the United States. Several factors

have brought this issue to the attention of healthcare academicians, public policy makers, and the community at large. Among these factors are:

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