Obesity as a risk factor for DM and IGT in Malta compared to Europe

Dr Antoine G SCHRANZ

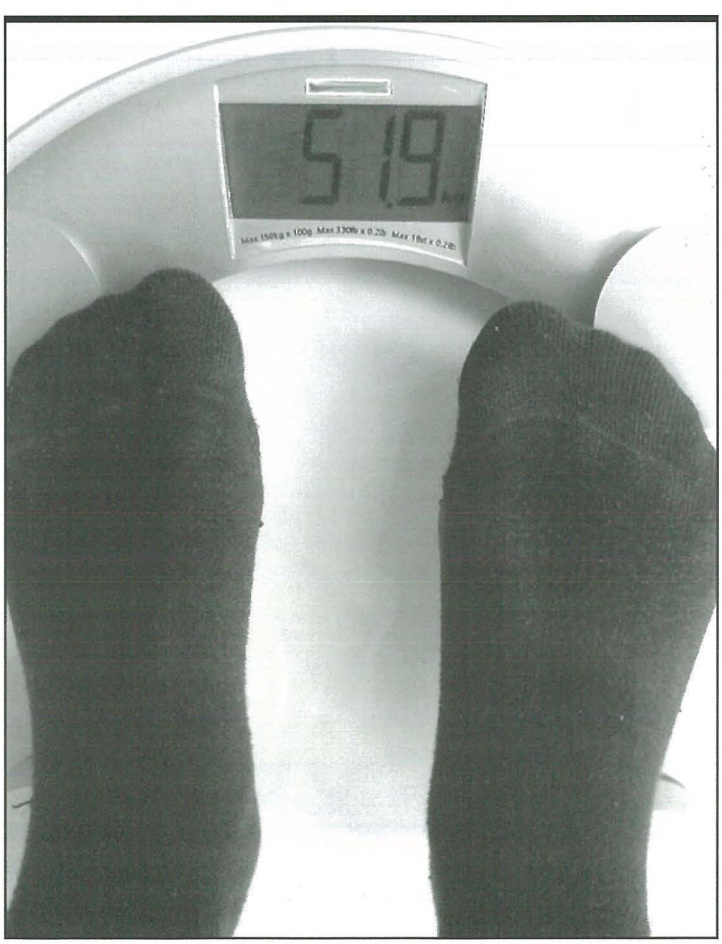
Aim: to evaluate the impact of obesity as defined by body mass index (BMI) on the prevalence of diabetes mellitus (DM) and impaired glucose tolerance (IGT) in Malta and compare it to other centres in Europe.

Methodology: a study of cross-sectional data of European population based surveys on the prevalence of diabetes in which a standard oral GTT was performed and classification based according to WHO criteria (as was done in the Malta National Diabetes Study).

Existing data on gender, age, height, and blood glucose (fasting and 2 hour) were analyzed and comparisons made between the different populations. This work was carried out within the DECODE-study project of the European Diabetes Epidemiology Group. Statistical analyses on pooled data were done with the collaboration of the National Public Health Institute in Helsinki, Finland.

Table 1. The Database

Population	Study size (n)	Age Range	% male	Mean BMI (kg/m2)
Malta	2045	29-87	43	28
Monica - Poland	364	44-73	47	28
Glostrup70 - Denmark	481	69-71	51	25
Glostrup45 - Denmark	678	44-46	47	24
E&W men - Finland	414	70-89	100	26
Goodinge - England	1036	36-77	44	26
Ely - England	1115	40-69	57	26
Cremona - Italy	1821	40-89	44	27
NSW - Sweden	2129	30-74	51	26
Police - Finland	1037	35-75	100	26
Uppsala - Sweden	1182	69-74	100	26
Finrisk - Finland	4727	31-64	47	28
All	17029	29-89	55	27



Patients: a description of the European populations studied is seen in Table 1.

Results: a large regional variation in prevalence of diabetes and impaired glucose tolerance was found between the 10 European centres; ranging from 2 to 24% for DM and from 5 to 34% for IGT. In Maltese men and women aged 29-85 the levels of crude prevalence were respectively: 19 and 21% DM and 6% IGT in both genders [Table2]. Differences clearly persisted even after stratifying for age - Malta showing the highest prevalence of DM in both sexes (particularly females) especially after age 50.

Like elsewhere, the effect of age on the prevalence of DM in Malta, adjusted for BMI, was lower in men than in women: a 10 year increase in age was associated with odds ratios of 1.86 (95% CI 1.61-2.15) in males and 2.12 (95% CI 1.87-2.40) in females ($p = 0.31$). On the other hand the effect of age on the prevalence of IGT was similar in both genders: 1.57 (95% CI 1.29-1.90). This impact of age was consistent throughout Europe.

As expected, BMI was also closely associated with DM and IGT prevalence. Overall, a rise of 1 kg/m^2 in BMI was associated with an increase in prevalence of DM of 12% (10-14%) in males and 10% (8-11%) in females. Correspondingly the prevalence of IGT was increased by 7% (5-9%) in both genders. The general effect of BMI on DM was statistically significant [$p<0.0034$ in males and $p<0.001$

in females]. Yet although obesity and DM are so common here, the effect of BMI was surprisingly not as strong as in many other parts of Europe. In fact in Malta the relative risk ratios, compared to the other centres, were found to be in the lower end in both men and women [Table 3]

Discussion: The findings confirm that the relationship between adiposity and DM in Malta is not a simple one. Nor it seems is it in other parts of Europe. In fact the non-systematic geographical variation in the prevalence of DM and IGT in the studied centres could not be explained by differences in age distribution or BMI. The overall effect of age on the prevalence of DM and IGT was found to be consistent and seemed somewhat larger than that of BMI - possibly due to the fact that a number of factors associated with deteriorating carbohydrate metabolism are also related to age. On the other hand the impact of BMI, even though quite uniform, tended to differ slightly between the centres. The reason is not clear. This effect was stronger in men than in women possibly in part influenced by a known higher tendency towards central obesity in males. All this raises the probability that other factors including ethnicity, diet and physical activity are important risk factors for DM, especially in Malta, and may very well account for a major part of the variation in prevalence rates in different regions.

Conclusion: The association in Malta between high levels of obesity and DM is clearly conditioned by other factors. This seems to be also the case within Europe where differences in the prevalence rates of DM and IGT are highly variable and not explained by variations in age or BMI, even though the impact of these seems important and was rather similar in the centres studied. This suggests that other factors like diet, physical activity and genetic predisposition evidently play significant and interactive roles and supports the need for research and sustained action on the modifiable risks here.

Dr Antoine G SHARNZ MD., D.Sc., MSc., Dip Diab.

Consultant Diabetologist, St Luke's Hospital, Guardamangia, Malta

Table 2. Glucose Tolerance and age distribution by gender

Population	Age range	Size (n)	NGT %	IGT %	DM %
Male					
Malta	29-85	871	74	6	19
Monica - Poland	44-73	172	63	28	9
Glostrup70 - Denmark	69-71	247	69	19	11
Glostrup45 - Denmark	44-46	318	42	34	24
E&W men - Finland	70-89	414	46	31	23
Goodinge - England	40-75	455	91	6	3
Ely - England	40-69	631	65	28	6
Cremona - Italy	40-83	805	77	11	12
NSW - Sweden	30-74	1035	84	13	3
Police - Finland	35-75	1037	90	7	3
Uppsala - Sweden	69-74	1182	53	30	17
Finrisk - Finland	31-64	2203	75	15	0
All	29-89	9371	74	16	10
Female					
Malta	29-87	1174	73	6	21
Monica - Poland	44-73	192	67	26	7
Glostrup70 - Denmark	69-71	234	61	30	9
Glostrup45 - Denmark	44-46	360	59	31	10
Goodinge - England	36-77	581	92	5	2
Ely - England	40-67	484	56	35	8
Cremona - Italy	40-89	1016	79	10	11
NSW - Sweden	30-74	1094	85	12	3
Finrisk - Finland	38-64	2524	78	13	9
All	29-89	7659	78	13	10

Table 3. Effect of BMI on prevalence (odds ratio) of DM and IGT-age adjusted

Population	DM - O.R.	95% C.I.	IGT - O.R.	95% C.I.
Male				
Malta	1.05	1.01-1.09	1.04	0.98-1.10
Monica - Poland	0.99	0.87-1.14	1.06	0.98-1.15
Glostrup70 - Denmark	1.02	0.91-1.14	1.08	0.99-1.18
Glostrup45 - Denmark	1.13	1.05-1.22	0.97	0.91-1.04
E&W men - Finland	1.09	1.02-1.16	1.03	0.98-1.09
Goodinge - England	1.18	1.05-1.32	1.10	1.01-1.19
Ely - England	1.15	1.09-1.21	1.08	1.04-1.12
Cremona - Italy	1.14	1.08-1.20	1.04	0.98-1.10
NSW - Sweden	1.12	1.01-1.23	1.09	1.04-1.15
Police - Finland	1.18	1.04-1.34	1.15	1.05-1.25
Uppsala - Sweden	1.18	1.13-1.23	1.07	1.04-1.15
Finrisk - Finland	1.16	1.12-1.20	1.07	1.04-1.10
All	1.12	1.10-1.14	1.07	1.05-1.09
BMI centre interaction*		P<0.0034		P<0.25
Female				
Malta	1.00	0.97-1.03	1.06	1.02-1.10
Monica - Poland	1.03	0.92-1.15	1.03	0.96-1.09
Glostrup70 - Denmark	1.08	1.03-1.21	1.08	1.02-1.15
Glostrup45 - Denmark	1.08	1.08-1.25	1.07	1.01-1.13
Goodinge - England	1.11	1.03-1.19	1.06	1.04-1.17
Ely - England	1.22	1.11-1.34	1.10	1.04-1.17
Cremona - Italy	1.15	1.10-1.19	1.14	1.08-1.22
NSW - Sweden	1.12	1.06-1.19	1.11	1.07-1.15
Finrisk - Finland	1.15	1.12-1.18	1.02	1.06-1.10
All	1.10	1.08-1.11	1.07	1.06-1.08
BMI centre interaction*		P<0.0001		P<0.13

** Chi2 test for the difference in effect on prevalence of DM and IGT between the centres*