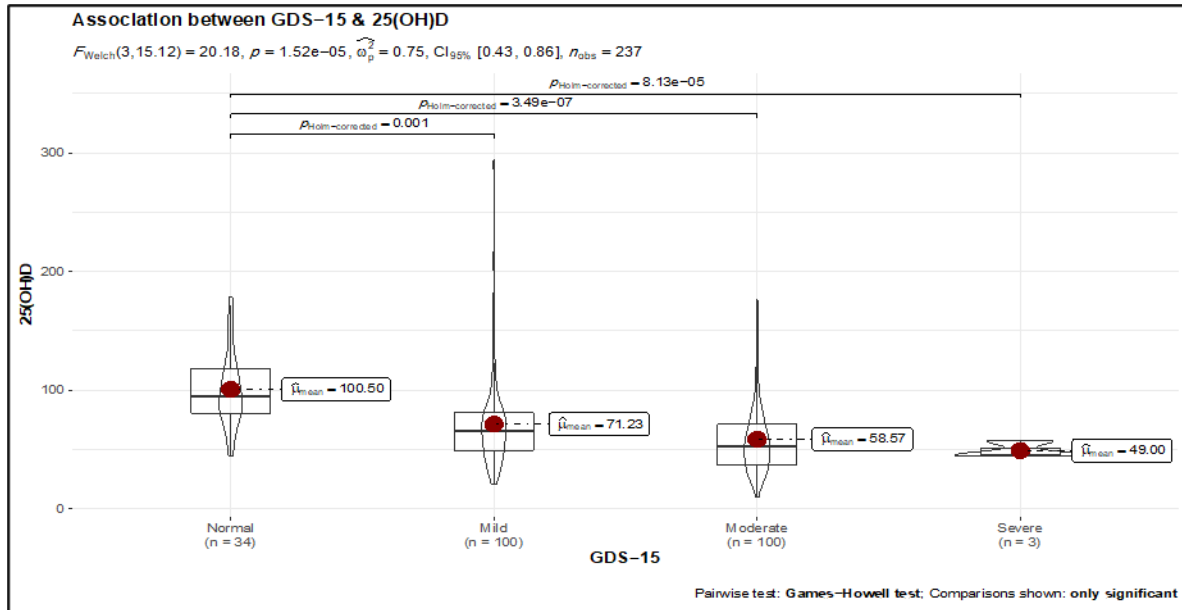


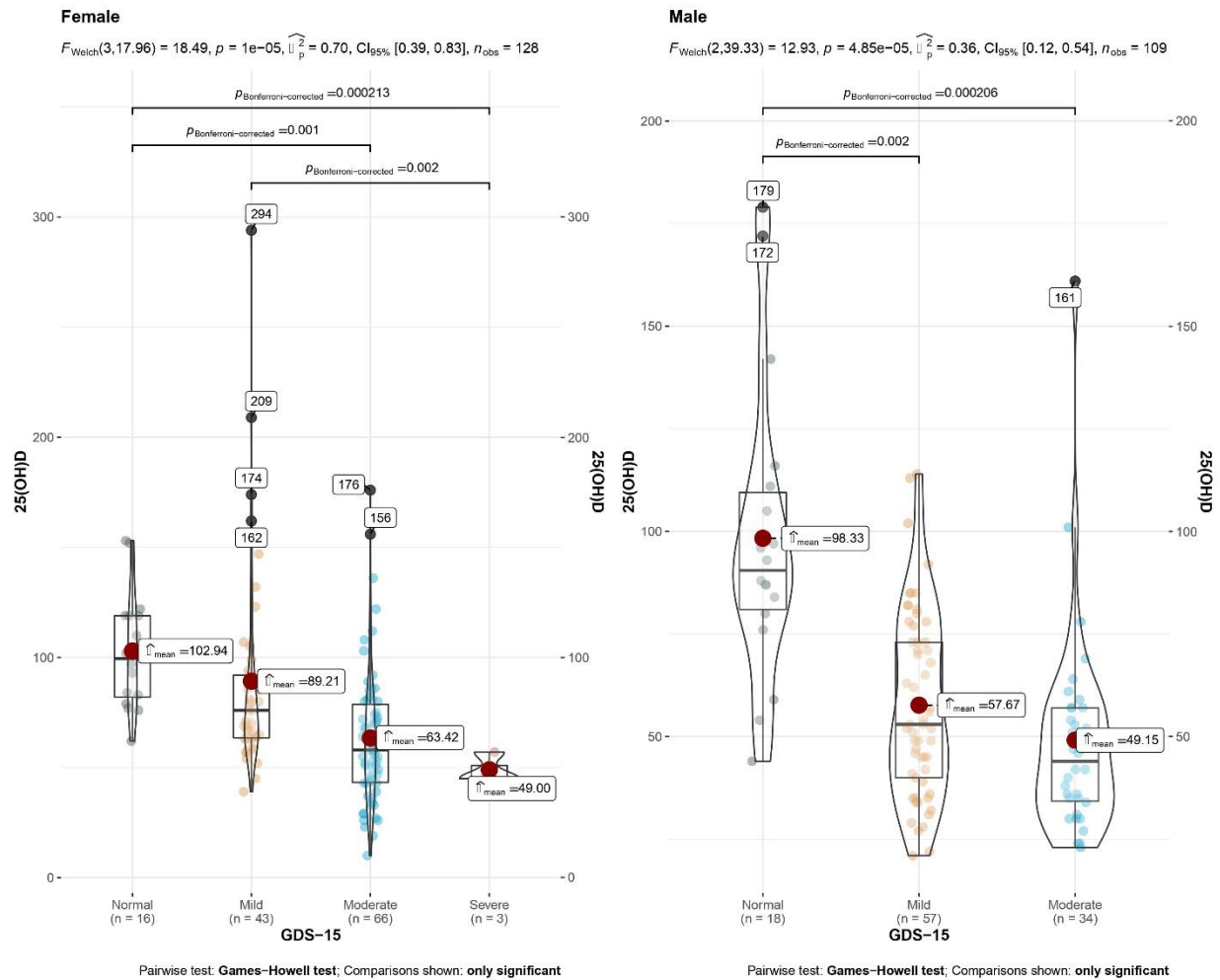
Lower blood vitamin D levels are associated with Depressive Symptoms in an Elderly Population in Kuwait: A Cross-sectional Study

Supplementary Material



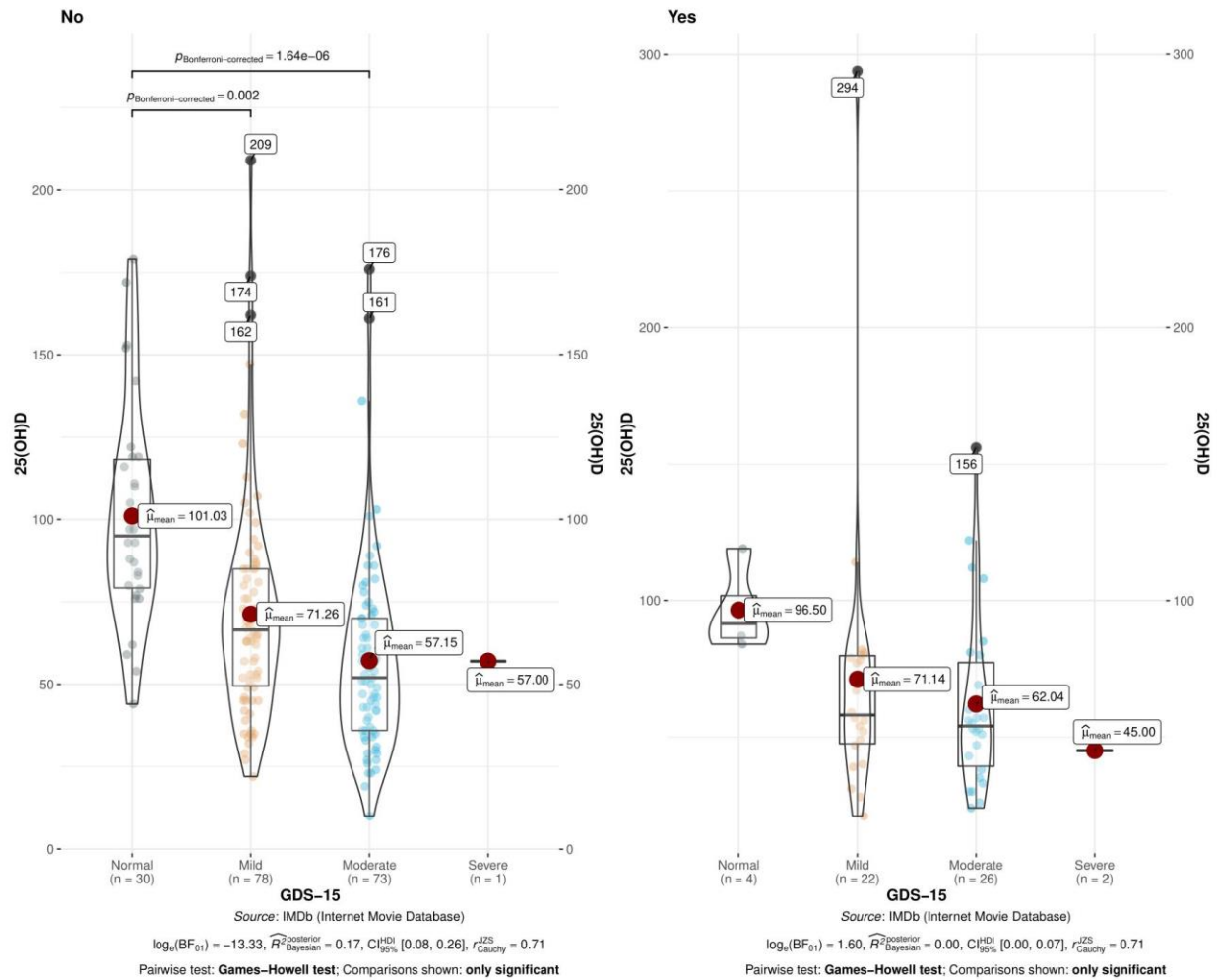
Supplementary Figure S1. Association between GDS-15 and 25(OH)D. Welch's test was statistically significant ($F_{\text{Welch}}(3, 15.12) = 20.18, p < 0.001, E(\omega_p^2) = 0.75, \text{C.I. [0.43, 0.86]}$) indicating an association between GDS15 and 25-OH-D levels. Post-hoc pairwise comparisons showed that the average 25-OH-D levels were significantly higher in participants with no depression symptoms than participants with mild, moderate, and severe depressive symptoms ($p < 0.001$ for all pairwise comparisons).

Association between GDS-15 & 25(OH)D grouped by Gender level



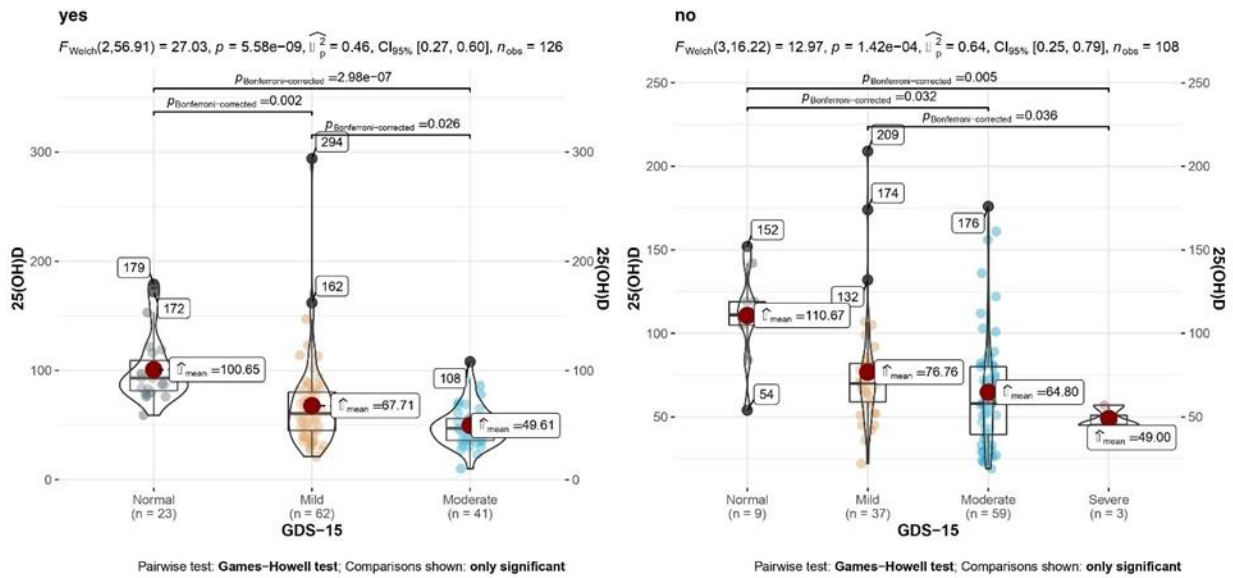
Supplementary Figure S2. Association between GDS-15 and 25-OH-D grouped by gender. When the analysis was stratified by gender, a statistically significant association was observed between GDS-15 and 25-OH-D levels in females ($F_{\text{Welch}}(3, 17.96) = 18.49, p < 0.001, E(\omega_p^2) = 0.70, \text{C.I.} [0.39, 0.83]$) and males ($F_{\text{Welch}}(2, 39.33) = 12.93, p < 0.001, \hat{\omega}_p^2 = 0.36, \text{C.I.} [0.12, 0.54]$). Pairwise comparisons indicated a statistically significant difference in the average 25-OH-D value among the pairs normal-moderate ($p = 0.001$), normal-severe ($p < 0.001$) and mild – severe ($p = 0.002$) depressive symptoms in female participants. In male participants, a significant difference was observed between the pairs normal-mild ($p = 0.002$) and normal-moderate ($p < 0.001$).

Association between 25(OH)D & GDS-15 grouped by patients with/without CVD



Supplementary Figure S3. Results of association between GDS-15 and 25(OH)D, grouped by CVD category. The finding shows significant association of GDS-15 with 25(OH)D, only for patients with no CVD. The Bonferroni pairwise test indicated significant differences in the average value of 25(OH)D among the pairs, normal-mild ($p=0.002$) and normal-moderate ($p=1.64 \times 10^{-6}$).

Association between GDS-15 & 25(OH)D grouped by Physical Activity (yes/no)



Supplementary Figure S4. Association between GDS-15 and 25(OH)D grouped by physical activity. The above finding shows significant association of GDS-15 with 25(OH)D for patients in the physical activity categories: Yes ($F_{\text{Welch}}(2,56.91) = 27.03, p = 5.58e-09, E(\hat{\omega}_p^2) = 0.46, CI [0.27, 0.60]$) and No ($F_{\text{Welch}}(3,16.22) = 12.97, p = 1.42e-04, \hat{\omega}_p^2 = 0.64, CI [0.25, 0.79]$). For patients in no physical activity category, the Bonferroni pairwise test indicated significant difference in the average value of 25(OH)D among the pairs, normal-mild ($p = 0.002$), normal-moderate ($p = 2.98e-07$), and mild-moderate ($p = 0.026$). Meanwhile, for the patients in the Yes category, the Bonferroni pairwise test indicated significant differences in the average value of 25(OH)D among the pairs, normal-moderate ($p = 0.032$), normal-severe ($p = 0.005$), and mild-severe ($p = 0.036$).

Supplementary Table S1: Results of ordinal logistic regression for the association between Depression and 25(OH) D status after adjusting for other factors

Predictors	OR	95% CI	p
Gender [Male vs. Female]	0.34	0.14 – 0.79	0.01
Age	1.04	0.98 – 1.11	0.20
Marital status [Married]	Ref		
Marital status [Divorced]	1.21	0.26 – 6.60	0.81
Marital status [Single]	1.78	0.19 – 39.94	0.64
Marital status [Widowed]	0.74	0.34 – 1.62	0.44
Income [<1000 KD]	Ref		
Income [1001-1500 KD]	0.73	0.31 – 1.71	0.46
Income [1501-2000 KD]	1.16	0.43 – 3.17	0.77
Income [More than 2000 KD]	1.09	0.36 – 3.38	0.88
Vitamin D supplementation [Yes vs. No]	1.06	0.36 – 3.28	0.91
Sleep duration (hours/day)	0.75	0.57 – 0.97	0.032
Physical activity [Yes vs. No]	0.34	0.18 – 0.63	< 0.001

Dyslipidemia [Yes vs. No]	1.53	0.74 – 3.15	0.25
Hypertension [Yes vs. No]	1.05	0.53 – 2.07	0.89
Cardiovascular or cerebrovascular disease [Yes vs. No]	1.94	0.98 – 3.91	0.062
Sun exposure [hours/day]	1.01	0.92 – 1.11	0.79
PTH concentration	0.95	0.86 – 1.06	0.38
Vitamin D: Deficiency	Ref		
Vitamin D: Insufficiency	6.40	2.20 – 19.91	<0.001
Vitamin D: Sufficiency	19.70	5.60 – 74.86	<0.001
OR: Odds ratio, CI: Confidence interval			